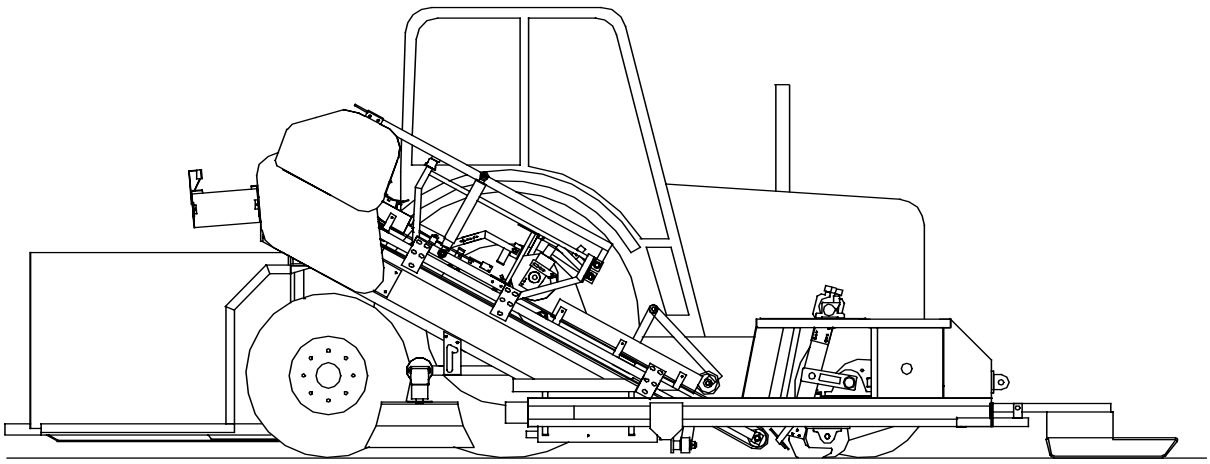
TURF - TICK

USERMANUAL

Turf Tick sod harvester



Version.2
March2000

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According to NEN5509 – 1993

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1. Introduction

The Turf Tick Sod Harvester is an excellent machine that is produced with the utmost care.

This investment will bring to you the greatest benefits if you carefully read and follow the instructions regarding safety, usage and maintenance as presented is this manual.

It is our urgent advice to read and study and follow the instructions in this manual.

The Turf Tick Harvester may not be operated by any person that has not fully read and understood the instructions in this manual.

In case of any questions about the content or this manual, please inform us at the shortest possible notice. We will react immediately in order to explain or otherwise contribute to safe and proper operation or the machine.

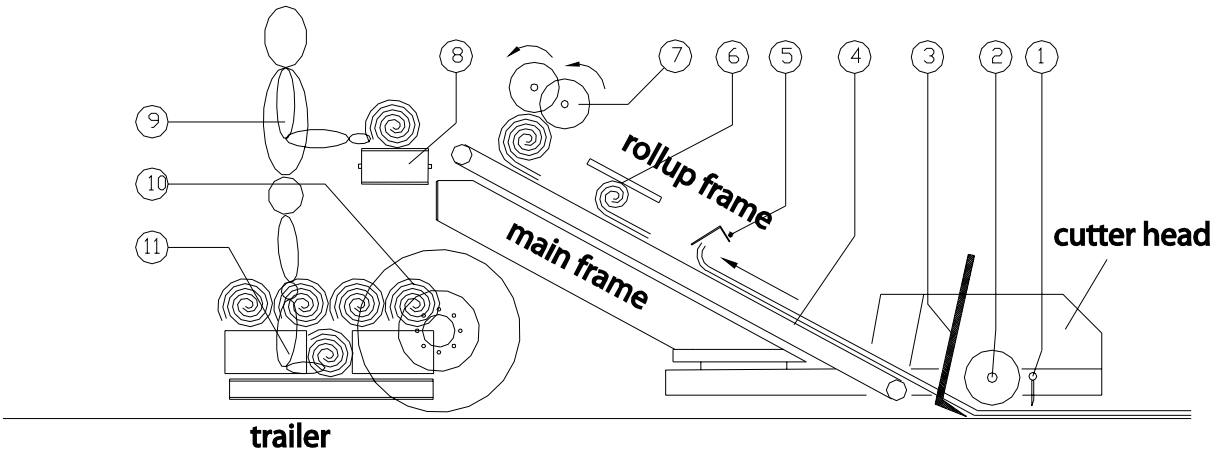
Disclaimer!!

Turf Tick Products B.V. cannot be held responsible for damage, direct or indirect, resulting partly or whole from operation errors, lack or proper maintenance or unskilled use or any other use of the machine than as described in this manual.

2. Operation

The Turf Tick machine cuts and rolls turf grass sods automatically. The machine needs to be connected with a tractor. See for information on this subject the chapter “Usage”. In Figure 1 is schematically shown the operation of the machine (the tractor is left out). The cutting blade (3) cuts the sod off the ground. A pressure roller (2) provides the necessary pressure on the soil and it drives through a rotary chain drive the length chop off blade (1) that cuts the turf vertically at the desired length.
The conveyor belt (4) transports the sod upwards, while the sod is being rolled. For rolling the sod, a rollup system is placed on the conveyor frame. This rollup system consists of a starter finger tray (5) that makes the first turn in a flat peace of turf that is fed up on the conveyor. Through the rollup tray (6) the turf is rolled further while moving towards the end of the conveyor. The rollup wheels (7) roll the last part of the turf piece and make sure the turf piece is entirely rolled in e nice tight roll with square sides.
Depending on which options are purchased with the machine, the roll is fed on a plastic plateau or on a cross conveyor (8), where after the sod can be stacked manually on the pallet (11). The person who stands on the platform besides the pallet does the stacking. The pallet can easily be dropped on the ground by lowering the cart with the three-point hitch operation lever on the tractor.
Independent of the three-point hitch can the cutting head together with the conveyor frame is lifted hydraulically, such that the machine can be transported without cutting the turf.

1. Chop off blade
2. Pressure roller
3. Cutting
4. Conveyor belt
5. Starting finger tray
6. Rollup tray
7. Rollup wheels
8. Cross conveyor
9. Stacker
10. Support wheel
11. Pallet



Schematically view operation of the Turf Tick sod harvester

3. Composition of the machine

The Turf Tick basic machine can be equipped with further options. The options can be supplied directly with the original purchase of the machine or they can be purchased separately in a later stage. The options are:

- Auto steer
- Cross conveyor
- Rotary brush

Figure 1 shows a number of these components.

3.1. Basic machine

The following major components of the Turf Tick basis machine can be distinguish:

- Cutting head, with in it
- Cutting blade, driven by crank axle
- Length chop off blade, driven by bottom roller through a chain drive with sprockets.
- Lifting arm mount for lifting the machine for transport.
- Basic frame, with in it
- Conveyor belt, driven by a hydraulic motor through a chain drive with sprockets.
- Starter finger tray
- Rollup tray
- Rollup rubber wheels, driven by a chain drive.
- Cart frame, including
- Platform where the "stacker", the person who stacks the sod on the pallet
- Pallet-forks with pallet
- Cart support wheels
- 3-point mount of tractor

3.2. Cross conveyor

It is possible to mount a cross conveyor near the end of the main conveyor frame, to automatically transport the sods in a cross direction when they leave the main conveyor. The cross conveyor is hydraulically driven.

3.3. Rotary brush

The rotary brush cleans during the cutting the next pass of the turf. It a inward position for transportation and a working position where it is swung sideways out so that it is in the position to sweep the edge of the turf field that is to be cut during the next pass of the harvester.

3.4. Auto steer

With the auto steer it is possible to steer the tractor automatic alongside the edge at the field that was produced by the previous harvesting pass. The system is electro-hydraulic. A steering “shoe” follows the edge of the turf. The frame at which the shoe is mounted is connected with an electronic sensor. The sensor provides a control unit with a signal that is related to the position of the shoe with respect to the cutting head frame.
A second sensor is connected to one of the front wheels of the tractor and provides a signal to the control unit that is related to the direction of the front wheels.
Both signals are compared inside the control unit and added with additional information. The control unit sends, if necessary, a steering signal towards the steering valve that is provided with the auto steer system. The electro-hydraulic valve controls the tractor steering hydraulic cylinder.

- Steering shoe with sensor, which follows the edge of the turf and
- Existing steering wheels on the tractor, with sensor for angle detection and moved with a hydraulic ram that is also used for regular hydraulic steering.
- Control unit, which controls the automatic steering based on signals from the steering shoe and wheel sensors.

A more extended description of the auto steer system can be found in the separate user manual that comes with the auto steer system. See for further details this separate auto steer manual.

4. Use of the harvester

The Turf Tick sod harvester is specially developed for:

- The cutting and automatic rolling of turf on levelled area at a speed of max 5 kilometres in 1 hour.
- In use the machine needs to be connected with a tractor that is suitable and fit for that purpose. Read for information on this subject also the chapter “Setting up for use”
- For taking with it in the field only one pallet with turf stacked on it. The absolute maximum weight of the pallet with turf is 1500 kg.
- **The Turf Tick sod harvester is not approved and designed for driving on the public roads** When transportation over public roads is necessary, the machine needs to adapted and checked to make sure that that it fulfils to all specific national or local prescriptions.

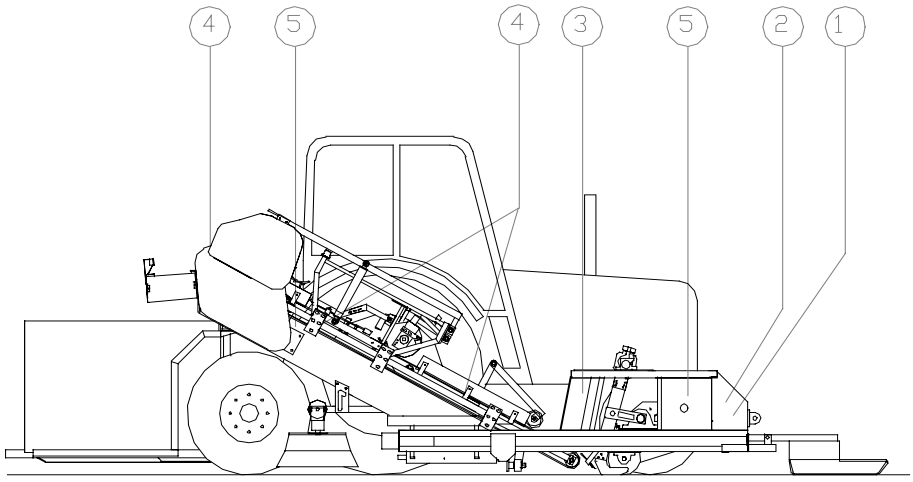
The machine is not developed for transport of people. Only on the platform (see chapter “operation “) it is permitted for one experienced person to stand and work.
During transportation it is not permitted for a person to be transported with the machine, beside the tractor driver, who is to be seated on the tractor seat

Use the Turf Tick only for the purpose it is developed.

5. General Safety prescriptions

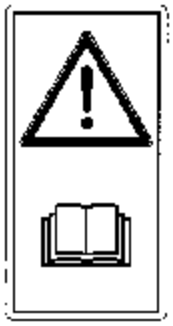
Read following Safety prescriptions entirely before starting operation of the machine.

On the machine are placed a number of pictograms, which are in this chapter further explained. On drawing below is pointed out where the different pictograms are located.
Learn the meaning of the pictograms; be sure to know the meaning of all of each of them!



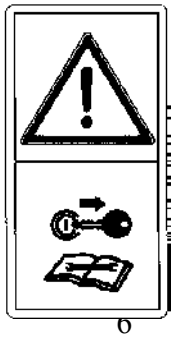
5.1.Safety prescriptions basis machine

1.
Be aware: Danger for serious injury when operating or otherwise being in the neighbourhood of the machine without being fully aware of the content of the user manual.



Read the user manual of the Turf Tick sod harvester carefully before operating or otherwise working with the machine, such that you know exactly forehand which potentially dangerous instances can occur in associated with the machine.

2.
Care! When maintaining danger for injury.



Before starting any maintenance or adjustment activities to the machine: Lower the machine entirely to the ground, switch off the electrical system, stop the engine of the tractor and take key out of contact. Pull handbrake on. If insecure about any technical or safety matter associated with the machine, check the appropriate

portion of the user manual or contact local experts or contact our factory.

It is of the utmost importance to make sure that no unexpected motion can occur during maintenance or adjustment activities associated with the machine. Lowering the machine entirely to the ground, stopping the engine and taking key out help preventing unexpected motion induced by the maintenance or adjustment activities or by another person who may induce unintended motion or who may be unaware of the ongoing maintenance or adjustment activities.

3.

Care! Danger for limbs or parts thereof caused by moving mechanical parts in the cutting head.

At cleaning, adjusting or otherwise doing labour in close proximity of the cutting head,

STOP the machine.

Do not approach the machine when not entirely come to a total stop.

Stay away with hands from moving parts.

Keep a distance of at least 5 meters from a working or moving machine.

4.

Care! Danger for injury caused by moving parts in and on the conveyor frame.

At cleaning of parts associated with the conveyor belts,

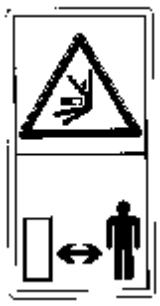
STOP the machine.

Do not approach the machine until the machine is entirely shut off.

Stay away with hands from any moving parts.

Keep at least 5 meters distance from a working or running machine.

5.



Care! When lifting or lowering of the machine, danger for (serious) injury.

Stay at least 5 meter away from a working machine

Approach only when sure that machine is entirely lowered on the ground and is fully switched off.

6.

Take care! Danger for injury when trapped if covers are removed

Make sure that all covers and shields in all instances are mounted 100% correctly when during use of the machine.

Only in case of maintenance it is allowed to remove the any covers or shields. See for this chapter maintenance.
Check on replacement of all covers and shields after maintenance.

7.
Care! Danger for injury, because of hydraulic system.
The hydraulic system operates with high pressure.
Before working at the system make sure that de system is no pressure at all. Highly pressurised oil (tot 160 bar) passes easily through clothing and infringes the skin. This can result in very serious injury to the skin. Highly pressurised oil can easily cause blood poisoning.

8.
Care! Danger during connecting and disconnecting the machine to the tractor.
Take care that during connecting and disconnecting the machine not a person is entirely or with any limb between the tractor and the machine.
For correctly connecting and disconnecting the machine to the tractor, read carefully the chapter "Use" of this user manual.

9.
Care! Danger while standing and working on the stacking platform besides the pallet.
In order to work safely on the stacker platform, following safety rules need be practised**.**

- Drive while cutting the turf never faster than walking speed.
- Avoid sudden movement of the harvester. Do not start driving abruptly and avoid abrupt stop operations. Before starting movement of the tractor, always make sure that the "stacker" is stable at his position and is aware that movement will start.
- When driving the machine while not cutting it is strongly advised that the stacker is not on the platform. In case of necessity for the stacker to be on the platform during transport of the machine, make sure that the stacker holds with his hands a stable support at the machine. Make sure that the stacker will not approach with his hands or limb any part of the machine that can start moving unexpectedly by any action or possible operator error. The stacker can stabilise his position by holding the end bar of the rollup frame. See also chapter "Operation". Remember that being on the platform during transport will remain a possibly hazardous activity that is to be handled with utmost care and may not be a regular activity. For inexperienced persons or with an inexperienced tractor driver it is absolutely forbidden.
- Do not drive backward with the stacker standing on the platform. Make it a 100% habit of waiting with driving backwards until the stacker has a safe distance from the path of travel of the machine.

10.
Watch out! Danger if not passing trough safety instructions to any new operator or stacker.
People can seriously hurt themselves if people do not pass trough the information about safety instructions. Make sure new users of the machine are fully informed about the instructions and dangers of the machine.

5.2. Safety instructions cross conveyor

11.
Watch out!
People can seriously hurt themselves if the protection covers of the cross conveyor are not mounted. Make sure the protection covers are always mounted before using the machine.

5.3.Safety instructions auto steer

12.
Watch out! Danger if disturbance auto steer.
People can seriously hurt themselves when the auto steer system steers the tractor not properly. Therefore, never drive faster than 5 km/h with auto steer switched on and stop the tractor immediately if failure happens.

13.
Watch out! Danger if unintentionally switching on auto steer.
People can seriously hurt themselves when you unintentionally switch on the auto steer. For instance if you drive on a public road. Therefore only switch on the auto steer if you start cutting grass. Before lifting the machine you have to switch off the auto steer.

14.
Watch out! Danger using automatic clutch by insufficient sight.
People can seriously hurt themselves when you can't see the person on the back of the machine and still want to use the automatic clutch. If the sight is insufficient, don't drive the machine.

6. Set-up preparation before starting

6.1. Basic Machine

The Turf Tick machine is assembled in three main parts.

- *The trailer* (parts book 101-52). This one is mounted on the 3-point hitch at the back of the tractor.
- *The sod harvester*, existing off cutter head, mainframe and rolling up frame. This one is connected to the trailer and on the bottom side of the tractor with a special mounting frame.
- *Mounting frame,* (parts book 100-50). This one needs to be made at size and mounted at the "belly" of the tractor. The mainframe of the cutting machine is mounted on this.

An employee of Turf Tick Products B.V is making the sod harvester at size in six steps.

These steps are:

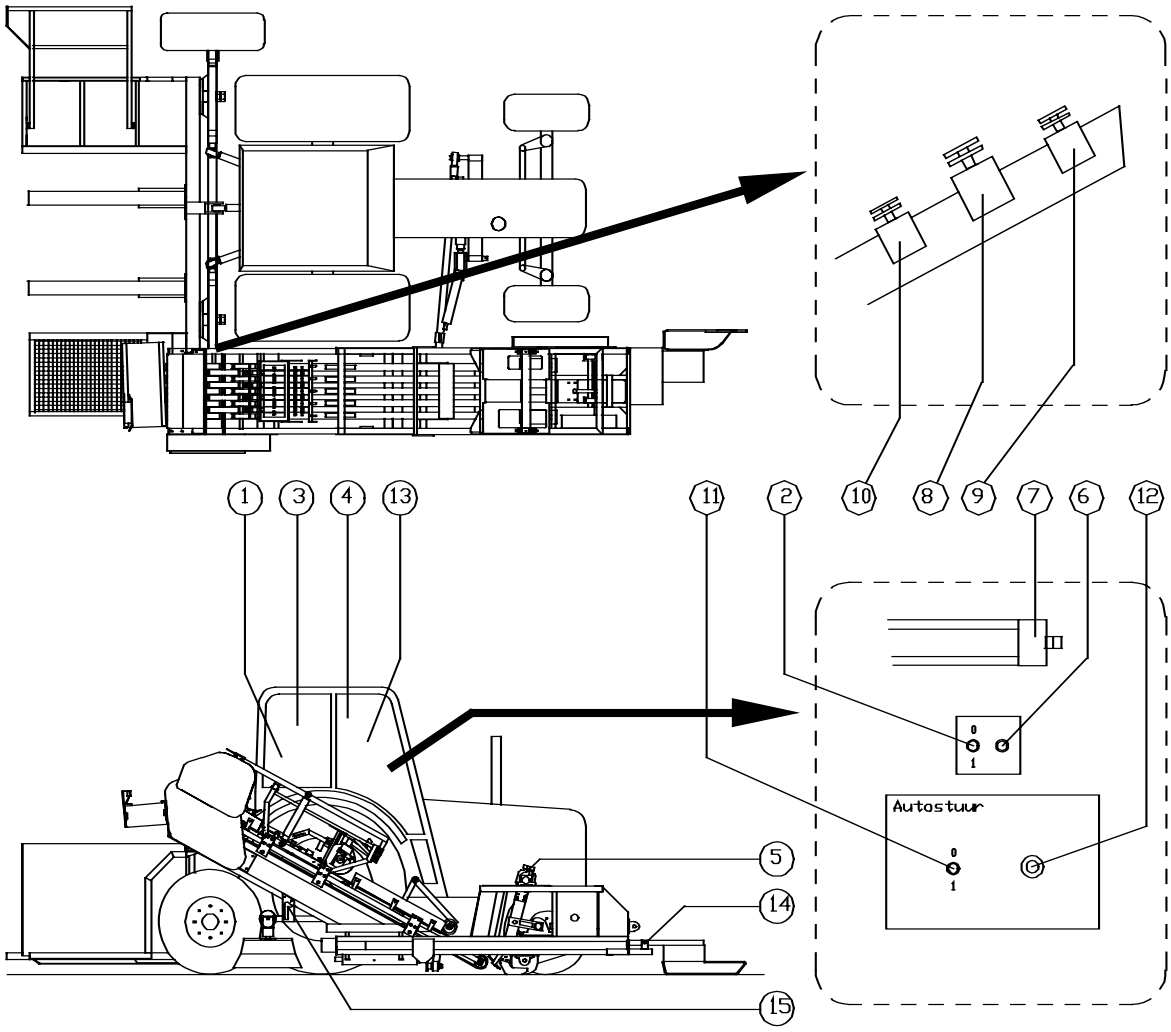
1. Connection of the *trailer* to the three-point hitch of the tractor.
2. Connection of the *sod harvester* to the *trailer* with a special connecting frame (parts book 101-52-17 en 101-52-16).
3. Making at size of the *mounting frame*, that the *sod harvester* is at the right distance of the tractor.
4. Connection of the hydraulic tubes.
5. Connection of the electric parts.
6. Adjustment of the sod harvester to your specific needs en circumstances (referred in chapter "Settings and adjustments".

7. Use

Before using the machine, it needs to be set upped (referred in chapter Set up preparation for starting), safety prescriptions completely read and the machine set upped and adjusted (referred in chapter “Settings and adjustments”)

7.1. Controls

There are several control functions distinguished for the control of the Turf Tick sod harvester. Some of them are related to the tractor it is mounted on. The controls of the tractor can be found in the manual of the specific tractor.



Overview of the control functions Turf Tick.

Pos. Nr.	Discription	User manual
	Basic machine	
1 (lever)	Switching on or off hydro pump through p.t.o-shaft.	Tractor
2 (switch)	Switching on or off hydraulic system	Turf Tick
3 (lever)	Lifting up and down sod harvester	Tractor
4 (lever)	Lifting up and down trailer.	Tractor
5 (adjustment button)	Manual depth adjustment cutting knife.	Turf Tick
6 (switch)	Electrical depth adjustment cutting knife.	Turf Tick
7 (turning button)	Fine-tuning speed main conveyor belts	Turf Tick
8 (turning button)	Setting speed-cutting knife.	Turf Tick
9 (turning button)	Settings speed conveyor belt.	Turf Tick
10 (turning button)	Settings speed rotary brush.	Turf Tick
	Auto steer	
11 (switch)	Auto steer system on/off	Turf Tick
12 (turning button)	Auto steer offset left/right	Turf Tick
13 (lever)	Hydraulic lifting up/down auto steer shoe	Tractor
14	Manually lifting up/down auto steer construction	Turf Tick
	Rotary brush	Turf Tick
15	Manually shifting in/out rotary brush	Turf Tick

7.1.1. Cutting the sod

To be able to cut the sod (with the basic machine) is required to execute the next handlings.

1. Make sure the sod harvester is lifted up (lever 3) and that the trailer is lifted up as far (lever 4) that the pallet forks are off the ground. The lifting arms from the trailer (parts book 101-52-02+03) are allowed to touch the rubber stops (parts book 101-52-20) slightly.
2. Drive to the starting point of cutting. Don't drive faster than 5 km/hr if the stack person is on the back.
3. Put an empty pallet on the pallet forks of the trailer.
4. Manoeuvre the machine in the right position.
5. Choose the right gear of the tractor to cut the sod (chapter settings and adjustments).
6. Lower the machine (lever 3). Make sure the lifting chain is completely without tension).
7. Switch on the hydraulic pump by turning on the p.t.o.-shaft (lever 1).
8. Switch on the hydraulic circuit with the switch (switch 2). The cutting knife and the main conveyor belt are starting to move.
9. Start driving and cutting the sod.

If pallet is full, then:

10. Drive as far till the last sod is just cut and stop the tractor.
11. Turn the last sod through) the main conveyor belt out of the machine.
12. Turn off the sod harvester (switch 2).
13. Turn off the hydraulic pump (lever 1).
14. Lift up the sod harvester (lever 3)
15. Drive to the location the pallet needs to be put down.
16. Lower the trailer as far (lever 4), that the pallet is on the ground.
17. Drive straight out of the pallet.
18. Lift up the trailer a little bit (lever 4), that the pallet forks are off the ground

7.1.2. Adjusting the cutting thickness

The depth off cutting in the ground specifies the thickness of the sod. This depth is easily changed with the next two methods:

1. Manually by turning the depth adjustment pipe (adjustment button 5). Before doing this stop the machine, Loosen the nuts from the depth adjustment pipe (parts book 100-56-109) a little bit. Watch out: Don't tighten this nut too much!
2. Fine-tuning with electrical depth adjustment (switch 6). This adjustment is possible while the machine is standing still or turning.

It is also possible to adjust the side plates (parts book 100-56-59) referring to the adjustment clamp (parts book 100-56-03). This allows an even greater adjustment limits (chapter settings and adjustments).

7.1.3. Speed main conveyor belts

The speed of the main conveyor belts is dependent to the driving speed. When the tractor is driving with a higher speed in the same gear, the speed of the main conveyor belt is simultaneously speeding up. It is important to drive in the right gear (chapter settings and adjustments).
The fine-tuning of the speed from the main conveyor belts is possible by turning a hydraulic valve (turning button 7).

7.1.4. Speed cutting knife

By turning the hydraulic valve (nr. 8). The maximum speed of the knife engine is adjusted, so the speed of the cutting knife. This means that if the speed of the p.t.o.-shaft is increasing due to speeding up the engine, the cutting knife speed is limited till the maximum adjusted speed. When the number of revolutions of the p.t.o.-shaft is increasing even more the speed of the cutting knife still remains limited at the maximum adjusted speed. Though the speed of the main conveyor belt is increasing at a higher number of revolutions of the p.t.o.-shaft.

Turning of the hydraulic valve:

- First loosen the lock washer a little bit. This is the lower one of the two rings on the valve. Before doing this loosen the hexagon socket head cap screws in the lock washer.
- Turn the hydraulic valve with the upper ring in the desired position.
- Tighten the lock washer and hexagon socket head cap screws.

7.1.5. Cross conveyor

The speed of the cross conveyor can be adjusted by turning the hydraulic valve (nr. 9). The cross conveyor is speeding up when the main conveyor belt is speeding up (higher number of revolutions) the p.t.o.-shaft).

Turning of the hydraulic valve:

- First loosen the lock washer a little bit. This is the lower one of the two rings on the valve. Before doing this loosen the hexagon socket head cap screws in the lock washer.
- Turn the hydraulic valve with the upper ring in the desired position.
- Tighten the lock washer and hexagon socket head cap screws.

7.1.6. Rotary brush

The rotary brush has a transport setting and a working setting. With button (nr. 15) the rotary brush can be set from the transport setting to the working setting and the other way around. The rotary brush starts turning when the hydraulic circuit is switched on (switch 2).

The speed of the rotary brush can be adjusted by turning the hydraulic valve (nr. 10). The rotary brush starts turning faster when the main conveyor belt is speeding up (higher number of revolutions of the p.t.o.-shaft)

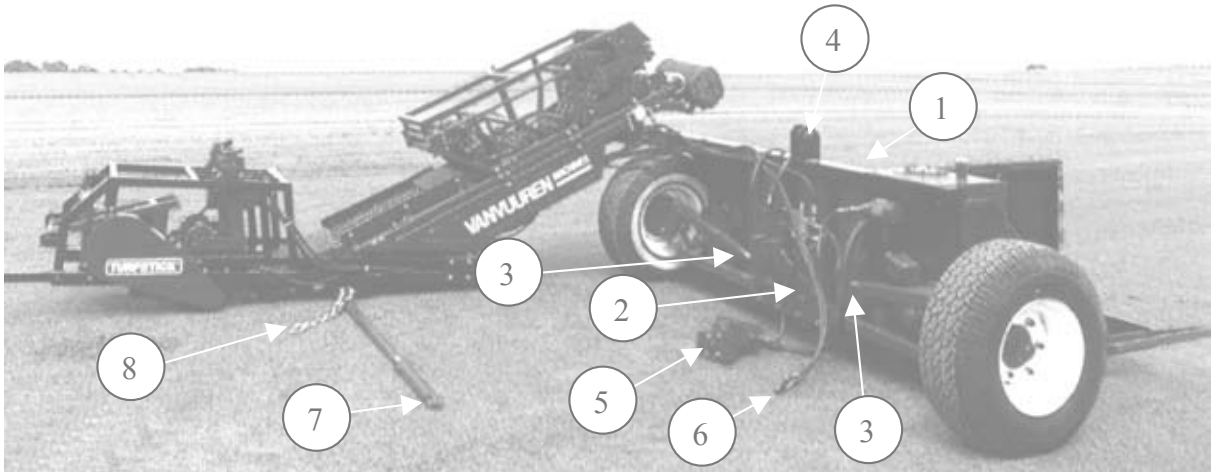
Turning of the hydraulic valve:

- First loosen the lock washer a little bit. This is the lower one of the two rings on the valve. Before doing this loosen the hexagon socket head cap screws in the lock washer.
- Turn the hydraulic valve with the upper ring in the desired position.
- Tighten the lock washer and hexagon socket head cap screws.

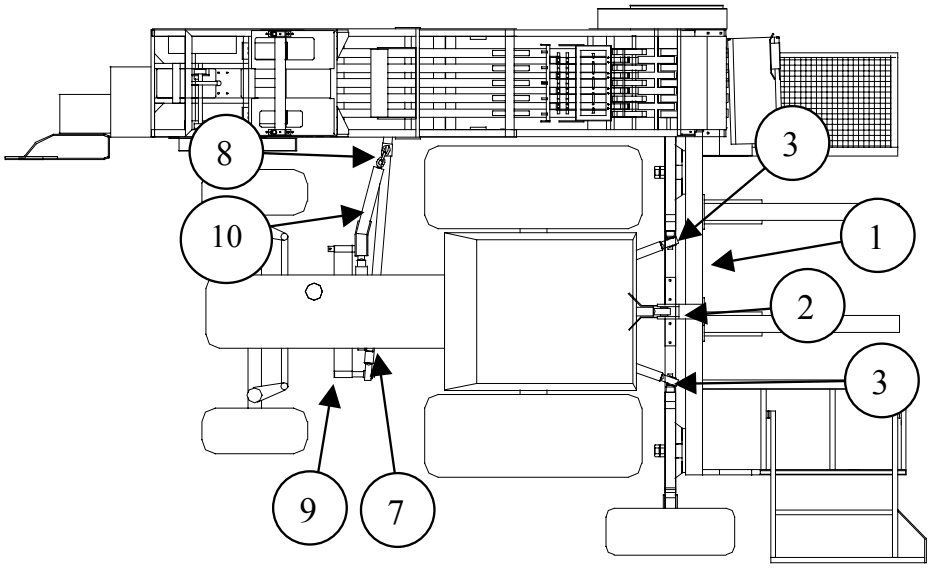
7.1.7. Auto steer

Before working with the auto steer, it needs to be correctly adjusted (chapter settings and adjustments). The fine-tuning is possible with the turning button (nr.12). This button lets the tractor steer a little bit more to the left or the right, allowing keeping no more grass border. You can put on or off the auto steer system with switch 11. From the moment the auto steer system is on, you can't steer manually any more. The auto steer system takes over the steering of the tractor. **Therefore, the auto steer system can only switched on if you want to start cutting! If the cutting process stops, the auto steer system has to be switched off with switch 11.**
The auto steer shoe, which is in front of the sod harvester, can be lifted hydraulic (lever 13). For transportation the auto steer frame can be lifted manually (nr. 14).

7.2. Clipping machine on and off from the tractor



Detached machine



Top view of attached machine

Poss.	Parts book	Description
1	101-52-09	Door trailer
2	101-52-05	Center plate trailer
3	101-52-02 + 03	Lower connection 3 point hatch trailer
4		Upper connection 3 point hatch trailer
5	101-53-17+18+03	Hydro pump + gearbox
6	101-53-10	Fine-tuning speed main conveyor belts (chapter usage)
7	100-50-03	Bar
8	100-50-19	Lifting chain
9	100-50-01	Connection point connecting frame
10	100-50-02	Lifting arm

Detaching the machine

1. Choose a place for detaching the machine. This needs to be a paved underground.
2. Place a sideways roll able support under the front of the sod harvester and put down the machine on this (this makes it easier to attach the machine).
3. Put the trailer on a flat underground.
4. Switch off the electric – and hydraulic system of the machine.
5. Stop the engine of the tractor und put it on the handbrake.
6. Put of the chain (nr. 8) from the hook of the lifting arm (nr. 10). To do this, don't stand in-between the machine and the tractor, but on the outside of the machine.
7. Release the D-shutter from the connection point on the tractor (nr. 9) and slide the bar (nr.7) from its connection point.
8. Open the door of the trailer (nr. 1) from the backside.
9. Release the different cables between the machine and the tractor with the connectors. Put the cables and the fine-tuning of the main conveyor belts (nr. 6) backwards over the trailer. This avoids that the cables come between the machine and the tractor.
10. If the machine is equipped with an auto steer system disconnects the two hydraulic tubes from the quick couplers of the tractor.
11. Release the top link of the tractor from its upper connection point (nr. 4) with the trailer.
12. Release the lock washer from the hydro pump (nr. 5) en slides it from the p.t.o.-shaft. Put the pump backwards over the trailer. This avoids that the cables come between the machine and the tractor.
13. Release the lock washer from the lower two connection points from the trailer (nr. 3) and slide off the two connecting rings from the tractor from it's connection points.
14. Start the tractor and drive it straight out.

Attaching the machine

1. Put the hydro pump (nr.5), fine-tuning speed main conveyer belts (nr. 6) and the electric cables backwards over the trailer. This avoids that the cables come between the machine and the tractor while attaching the machine. If the machine is equipped with an auto steer system, you also need to put the hydraulic tubes backwards over the trailer.
2. Hang chain (nr. 8) over the machine.
3. Open the door of the trailer from the backside.
4. Drive the tractor as far backwards (over bar nr.7) that the lower pull bar off the tractor is leaded into Center plate of the trailer.
5. Watch out that nobody is in-between the trailer and the tractor! Connection of the diverse parts of the trailer only through the opened door from the backside.
6. Bring the two connection eyes from the lifting system of the tractor in the right height for connection of the two lower connecting points of the trailer (nr. 3).
7. Drive the tractor as far backwards that the two connection eyes from the lifting system of the tractor can be slide on the two connection points of the trailer (nr. 3). Lock the connection with the two lock clips.
8. Switch of the hydraulic - and electric system of the sod harvester, turn off the engine of the tractor, put it on the handbrake and take out the key from the contact.
9. Slide the hydro pump (nr. 5) on the p.t.o. shaft en make sure this is correctly locked. Locking is dependent on the type of tractor.
10. Connect the top link of the tractor to the upper connection point (nr. 4) of the trailer.

11. If the machine is equipped with an auto steer system, put the two hydraulic tubes in the quick couplers of the tractor.

12. Connect the different electrical cables of the machine with the cables of the tractor.

13. Slide bar (nr. 7) on the connection point of the tractor (nr. 9) en lock this with the lock clip.

14. Put the lifting chain (nr. 8)on the lifting arm (nr.10). Don't stand in-between the machine and the tractor, but stand on the outside of the machine.

7.3. Change cutting blade

The cutting blade of the machine is heavily loaded and for that reason in needs to be changed regularly. The cutting blade needs to be changed if:

- The cutting blade is that much blunt that it doesn't cut properly any more. It starts bending out or even pushing itself out of the ground.
- The cutting blade is unevenly worn-out, that the sod isn't of a constant thickness anymore. One side is thicker than the other.

Procedure changing the cutting blade:

1. Unfold the support leg of the machine (front side of the machine). Put a support block under the machine if it is equipped with an auto steer system.
2. Lower the machine on the support leg or support block.
3. Switch off the hydraulic – and electrical system of the machine, turn off the engine, put it on the handbrake and get the key out of the contact.
4. Change the cutting blade. Watch out: Tighten the bolts as much as possible and remind toothed lock washers to avoid loosening.

7.4. Settings and adjustments

7.4.1. Main conveyor belt speed

For an optimal performance of the Turf Tick sod harvester it is of great importance that the speed of the main conveyor belts corresponding to the driving speed is adjusted correctly. The speed of the main conveyor belts is associated with the driving speed of the tractor (trough the p.t.o. shaft). So when the tractor is driving faster (in the same gear), the speed of the main conveyor belts start to speed up the same. The speed of the main conveyor belts stays right according to the driving speed.

Influence factors on the speed of the main conveyor belts.

The speed of the main conveyor belts according to the driving speed of the tractor is specified by:

The tractor:
- The gear that is driven in.
- Choice of p.t.o. shaft gear (1 or 2 possibilities dependent on the type of tractor)

The sod harvester:
- Gear wheel unit hydraulic pump (parts book 101-53-18)
- Pump produce hydraulic pump (parts book 101-52-17)
- Slag volume Hydraulic engine main conveyor belts.
- Gear wheel relations drive main conveyor belts.
- Fine-tuning main conveyor belts (parts book 101-53-10, chapter usage)

The sod harvester is standard delivered with specific settings (gear wheel unit, pump, etc.) This means that the tractor needs to be adapted to gain the right speed of the main conveyor belts in relation to the driving speed. Choose the right driving – and p.t.o. shaft gear.

If you want to use a different driving gear, because you want to cut faster or slower, the sod harvester needs to be adjusted different. This is easily possible by changing the gear wheel relation drive main conveyor belts.

The right speed of the main conveyor belts in relation to the driving speed.

The goal of a right adjustment of the *speed from the main conveyor belts is that it needs to be a little bit faster than the driving speed of the tractor* while cutting the sods. If the speed is lower than the driving speed the sods are pushed up while if the speed is too fast, the sods are torn apart.

A Distance between two successive sods
1 Chain drive main conveyor belts

Doing this can check the right adjustment:

- Measure the Distance between two successive sods like it is indicated in the image (A). Do this by switching off the hydraulic system at the right time (chapter usage) and bring to standstill the tractor. After doing this you can measure the distance.
- The right distance for a properly adjusted machine needs to be between the 5 and 25 cm.

Adjustment right speed main conveyor belt in relation to the driving speed

If the **speed of the main conveyor belts is too fast** ("A" too big) the driving of the tractor needs to happen in a **higher gear**.

If the **speed of the main conveyor belts is too low** ("A" too little) the driving of the tractor needs to happen in a **lower gear**.

Changing of the gear from the tractor

The tractor needs to adapt to the machine, by choosing a gear, to realise the right speed of the main conveyor belts.
When driving in the right gear, it doesn't matter any more how much gas is given: The speed of the main conveyor belts remains correct.

If you want to drive in a higher or lower gear, the machine needs to be changed by changing the gear wheel relation from the main conveyor belts.

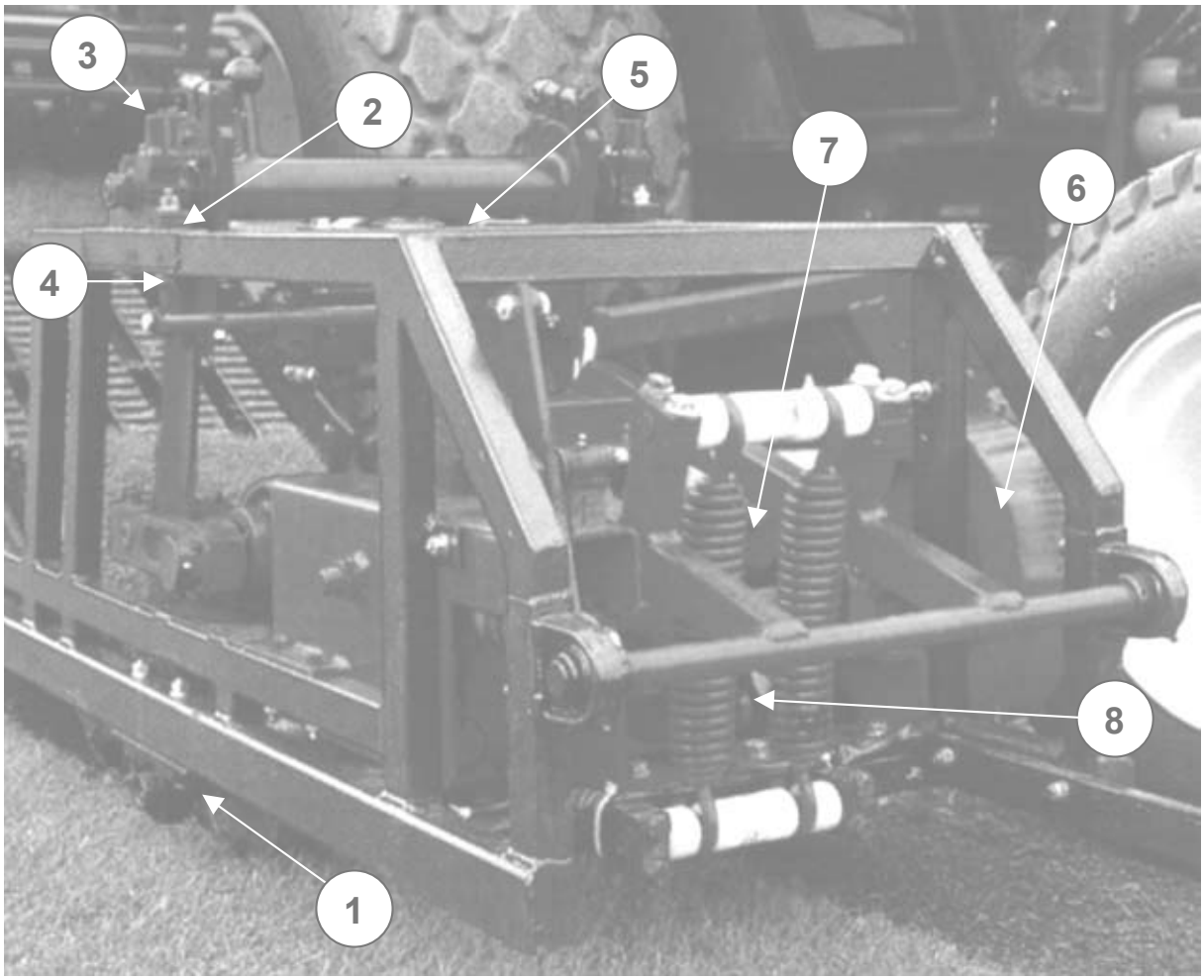
In the lower table is given an overview for the possible speeds of the main conveyor belts for two different numbers of revolutions.
These tables together with the table book of the tractor regarding to the number of revolutions of the p.t.o. shaft can give you the information which driving gear can be driven in for a given gear wheel relation of the main conveyor belts.

Speed main conveyor belts (km/hr) **With different gear wheel relations** **Number of revolutions of the p.t.o.-shaft = 540 rev/min**						
		Gear wheel belt roll back (parts book 100-59-29)				
		19 teeth	**21 teeth**	**23 teeth**	**25 teeth**	**27 teeth**
Gear wheel hydro. engine (Parts book (100-58-13)	**15 teeth**	4.5	4.1	3.7	3.4	3.2
	16 teeth	4.8	4.4	4.0	3.7	3.4
	17 teeth	5.1	4.6	4.2	3.9	3.6
	19 teeth	5.7	5.2	4.7	4.4	4.0
	21 teeth	6.3	5.7	5.2	4.8	4.5
	23 teeth	6.9	6.3	5.7	5.3	4.9

Speed main conveyor belts (km/hr) **With different gear wheel relations** **Number of revolutions of the p.t.o.-shaft = 350 rev/min**						
		Gear wheel belt roll back (parts book 100-59-29)				
		19 teeth	**21 teeth**	**23 teeth**	**25 teeth**	**27 teeth**
Gear wheel hydro. engine (Parts book (100-58-13)	**15 teeth**	2.9	2.7	2.4	2.2	2.1
	16 teeth	3.1	2.8	2.6	2.4	2.2
	17 teeth	3.3	3.0	2.7	2.5	2.3
	19 teeth	3.7	3.4	3.1	2.8	2.6
	21 teeth	4.1	3.7	3.4	3.1	2.9
	23 teeth	4.5	4.1	3.7	3.4	3.2

7.4.2. Cutter head

The cutting blade and the chop off knife are located in the cutting head. Different parts are adjustable.



Settings and adjustment cutter head

Pos.nr.	Settings and adjustment
1	Main roll gear (3 positions)
2	Horizontal adjustment depth control blade pitch (3 positions)
3	Adjustment margin eccentre
4	Depth adjustment cutting blade (3 positions)
5	Adjustment V-belts tension cutting blade.
6	Adjustment lenght of the sod by changing the gear wheel relation.
7	Adjustment tension of the chain by sprocketwheel.
8	Horizontal adjustment camshaft for chop off knife

Note 1

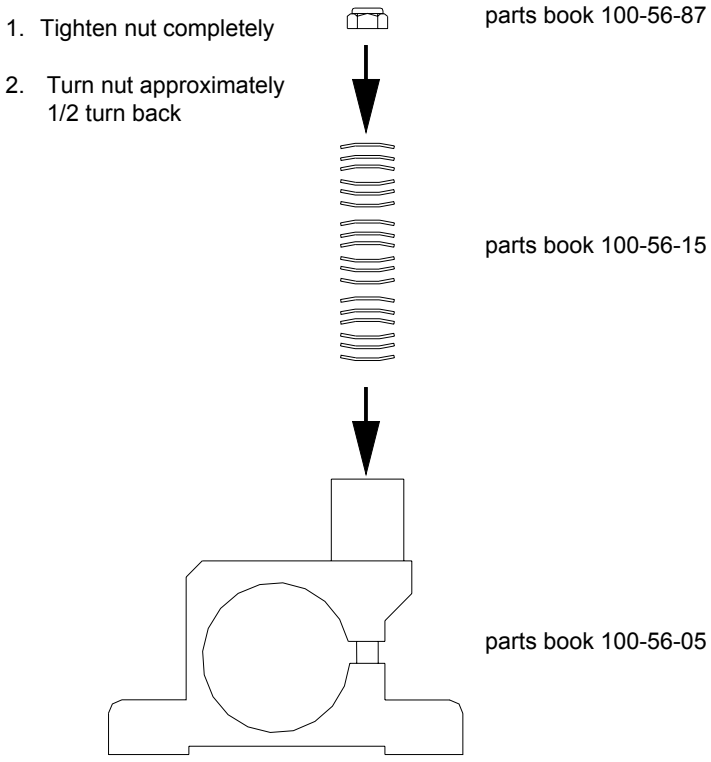
The main roll is horizontaly adjustable in 3 positions, by changing the bearing houses on both sides of the main roll.

The distance between the cutting blade and the main roll can be changed with adjusting the main roll. Normally it is the best to keep the distance between the mainroll and the cutting blade as little as possible (mainroll backwards). Especially when the sod is very dry or wet or

the field has a lot a tracks. If there are lot of stones in the ground, you need to make the distance between the cutting blade and the main roll bigger, otherwise the cuttingblade can seize up with the main roll.

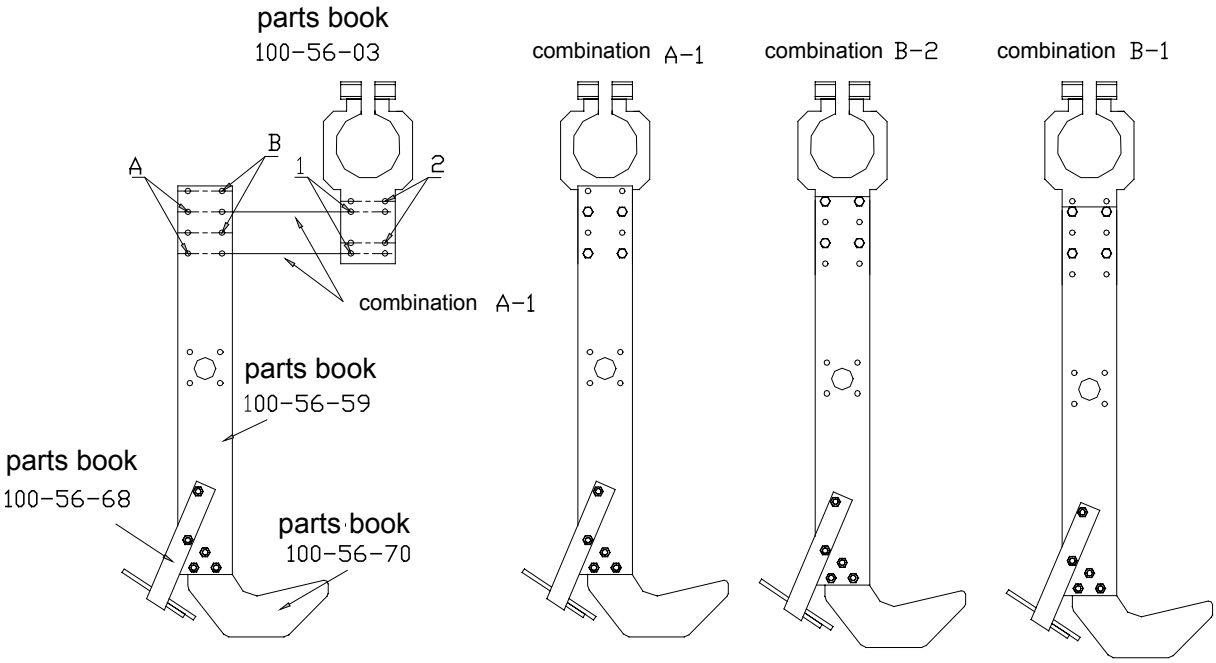
Note 2
The depth adjustment / blade pitch is adjustable in 3 longitudinal positions by changing the place of the eccenter blocks on both sides of the frame. Because this adjustment influences the blade position in longitudinal direction, it changes the blade pitch.

Note 3
De margin from the bronze excenterbus (partsbook 100-56-06) in the excenterhuis (partsbook 100-56-05) needs to be properly adjusted an be checked at maintenance. The right adjustment can be found in the drawing below.


1. Tighten nut completely
2. Turn nut approximately 1/2 turn back
parts book 100-56-87
parts book 100-56-15
parts book 100-56-05

Adjustment margin eccentric

Note 4.
For normal use the range of the depth adjustment described in the chapter “usage” is sufficient. If you want an even bigger adjustment range, it is possible to change the position of the side plates (parts book 100-56-59) in relation to the adjustable depth clamp (parts book 100-56-03) by choosing different mounting holes. Look at the drawing below.



Adjustment possibilities for change of depth.

Note 5.
The cutting knife engine drives trough 3 v-belts the crankshaft from the cutting knife. The tension of the v-belt can be changed, by sliding the frame; the cutting knife engine is mounted to.

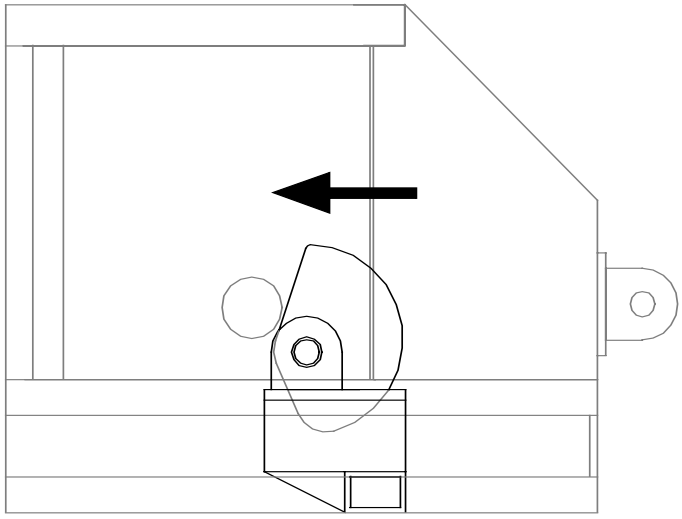
Note 6
A chain drives the camshaft for the chop off knife from the main roll. With the choice of two gear wheels (parts book 100-57-30 en 100-57-32) the length at witch the sod is cut off can be changed.

The driving gear wheel Parts book 100-57-30	**The driven gear wheel Parts book 100-57-32**	**Sod surface**
15 teeth	55 teeth	1 m2 (sod 40 cm wide)
15 teeth	45 teeth	1 yd2 (sod 16" wide)
17 teeth	45 teeth	1 yd2 (sod 18" wide)

Note 7.
The tension of the chain from the camshaft drive can be adjusted by sliding the sprocket wheel (parts book 100-57-31). Before doing the screening roof needs to be removed.

Note 8
To make sure that the chop off frame is following the crankshaft correctly, the cutting eccentric (parts book 100-57-05) is adjustable in horizontal direction). When the machine is delivered, this adjustment is correctly.

The right adjustment is: as far as possible in the direction of the back of the machine. Look at the drawing below.



For the right adjustment put the camshaft as far as possible in the direction of the back of the machine

Note: This adjustment is not meant for tightening the driving chain. This needs to be done with the sprocket wheel (pos. nr. 7).

7.4.3. Main frame

The main conveyor belt is mounted on the main frame. The main adjustment points are:

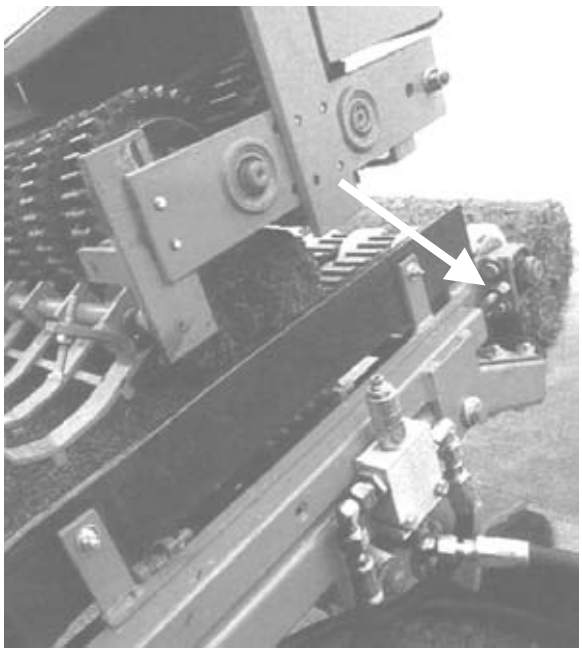
- Adjustment conveyor belt tension
- Adjustment scrapers upper and lower belt roll

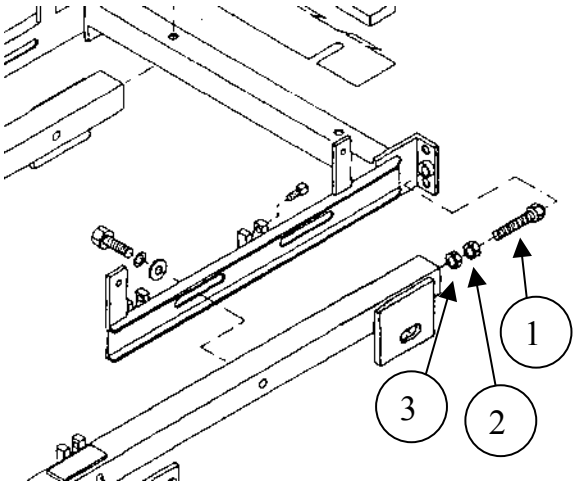
<u>Adjustment tension main conveyor belts</u>

The right tension of the main conveyor belts is important. In the images below the adjusting of this tension is indicated.

Procedure:

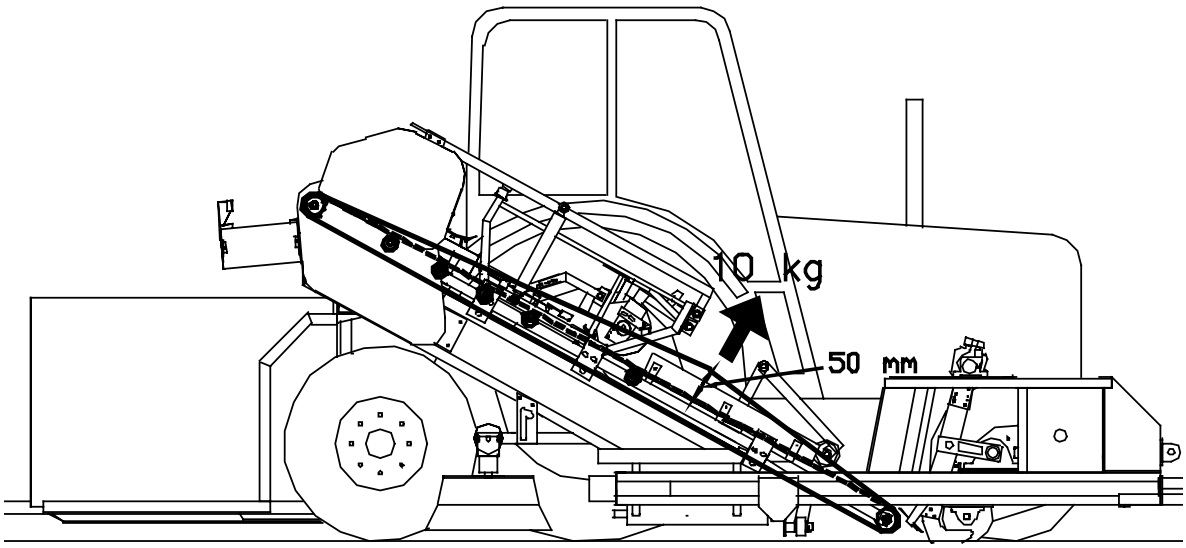
1. Loosen contra nut (2)
2. Put fork wrench on the adjustment nut (1) and turn the nut.
3. Check the tension of the conveyor belts by pulling them up with a force of 10 kg. Measure the displacement. This needs to be 50 mm. Look at the drawing.
4. Check that the adjustment on the left and the right side are evenly turned out, otherwise the conveyor belts are bumping into the left or right side.
5. Tighten contra nut (2).





Adjustment point tension conveyor belts.:

1. **bolt**
2. **contra nut**
3. **nut**

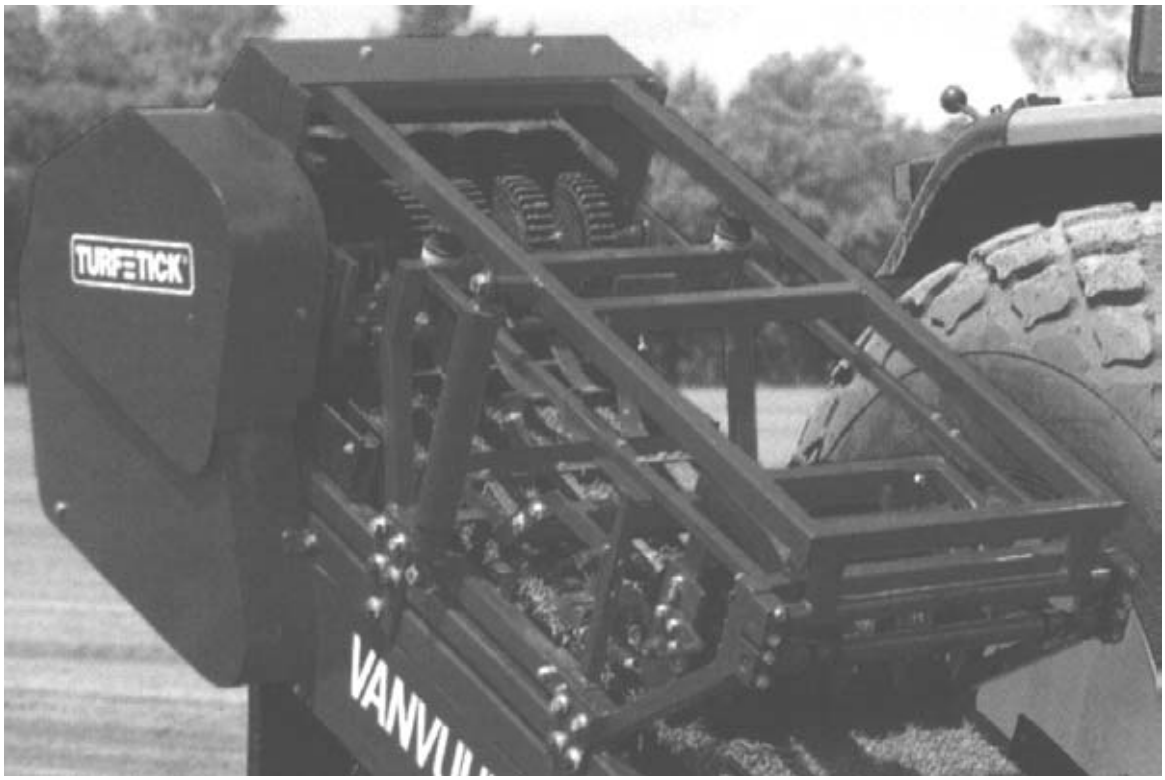


Measure point tension conveyor belts

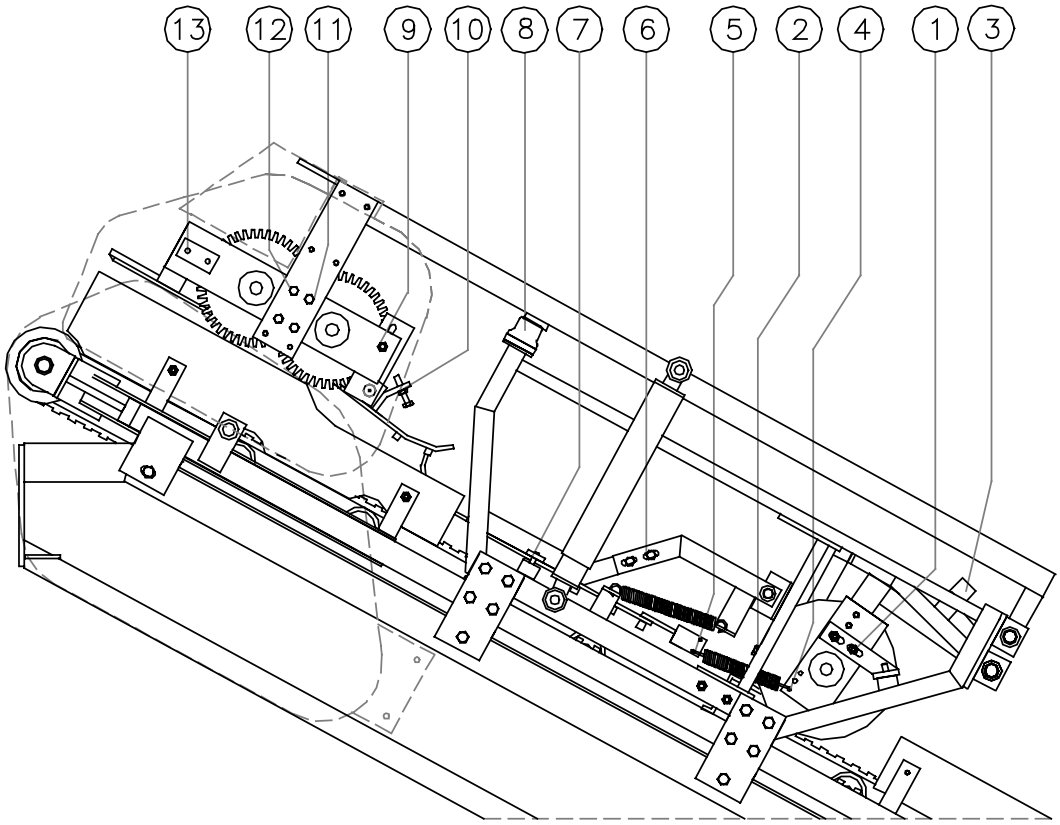
Adjustment scrapers

Due to wear, the scrapers from the upper and lower belt rolls need to be readjusted. Both scrapers have slot holes through which they can slide. They need to be adjusted that they touch the belt rolls (parts book 100-59-4 and 100-59-5).

7.4.4. Rollup system



Rollup system



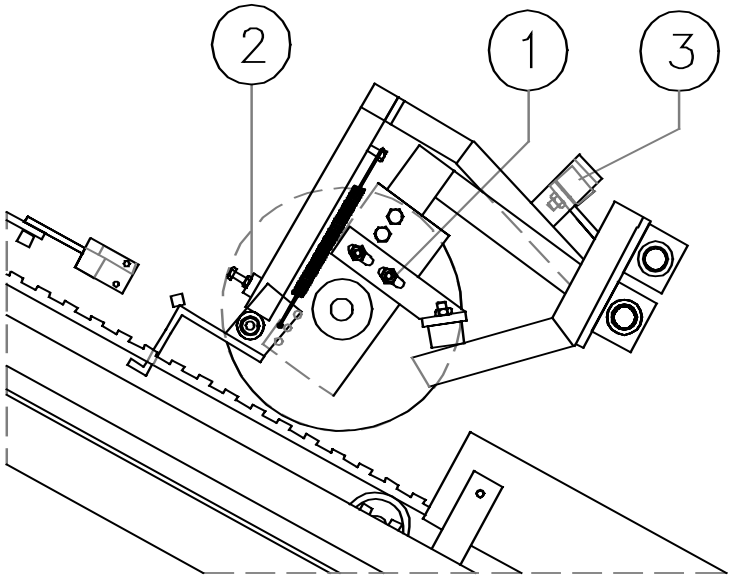
Side view rollup system (chain drive removed, chain screening dotted)

Settings and adjustment rollup system

Nr.	Way to adjust	Parts book
	I starting part	
1	Slot hole adjustment	101-50-14
2	Bolt and contra nut	101-50-62 + 60
3	Turning in/out rubber stop and contra nut	101-50-32 + 60
	II rolling board part	
4	Choice hole spring connection	101-50-10
5	Choice hole spring connection	101-50-23
6	Choice hole + adjustment slot hole	101-50-05 + 06
7	Turning in/out rubber stop and contra nut	101-50-32 + 60
	III rolling wheels part	
8	Moving synthetic material ring	101-50-27
9	Slot hole adjustment	101-51-08 + 09
10	Bolt and contra nut	101-51-32 + 56
11	Slot hole adjustment	101-51-06
13	Slot hole adjustment	101-51-07
13	Slot hole adjustment	101-51-02 + 42

After this part the different settings and adjustments are explained. Goal of a correct adjusted rollup system is to roll the sod into tight rolls and that they come out of the rollup system in the right position.

I starting part

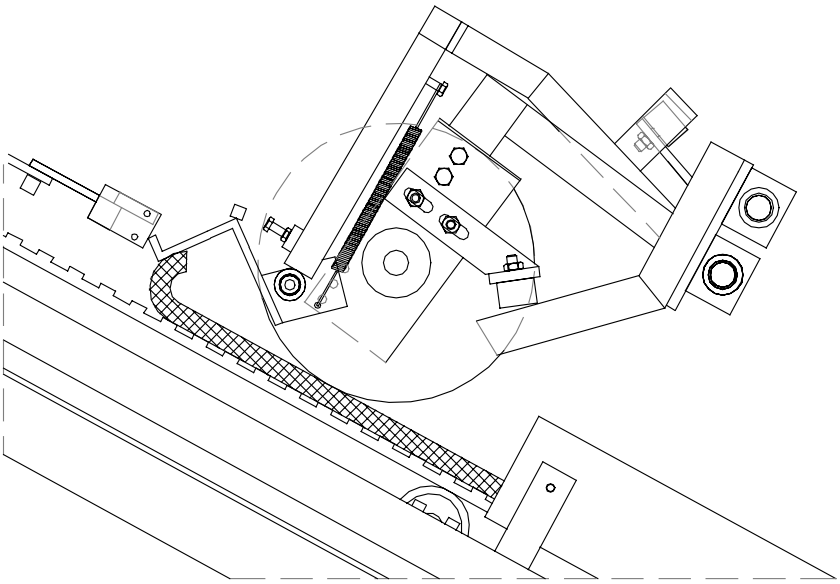


Schematically drawing starting part

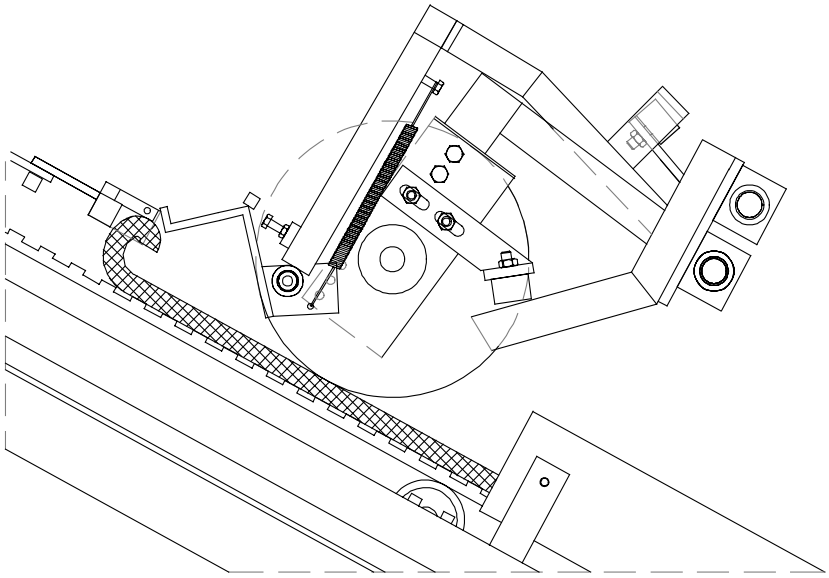
1	Adjustment height press roll
2	Adjustment turning fingers
3	Adjustment height fingers

At the starting part the beginning of the sod is folded, so that the rolling board and rolling wheels can roll up the sod further.

With adjustment 1 the distance between the black wheels (parts book 101-50-19) and the conveyor belts can be adjusted. This distance is a little bit less than the thickness of the sod, so that the black wheels can push the sod when the sod touches the fingers (parts book 101-50-04) to make a beginning.
The fingers fall in-between the conveyor belts, so the sod always touches the fingers regardless of the thickness of the sod.
How deep the fingers stab into the conveyor belts is adjusted with adjustment 3. The starting angle of the fingers is adjusted with adjustment 2.



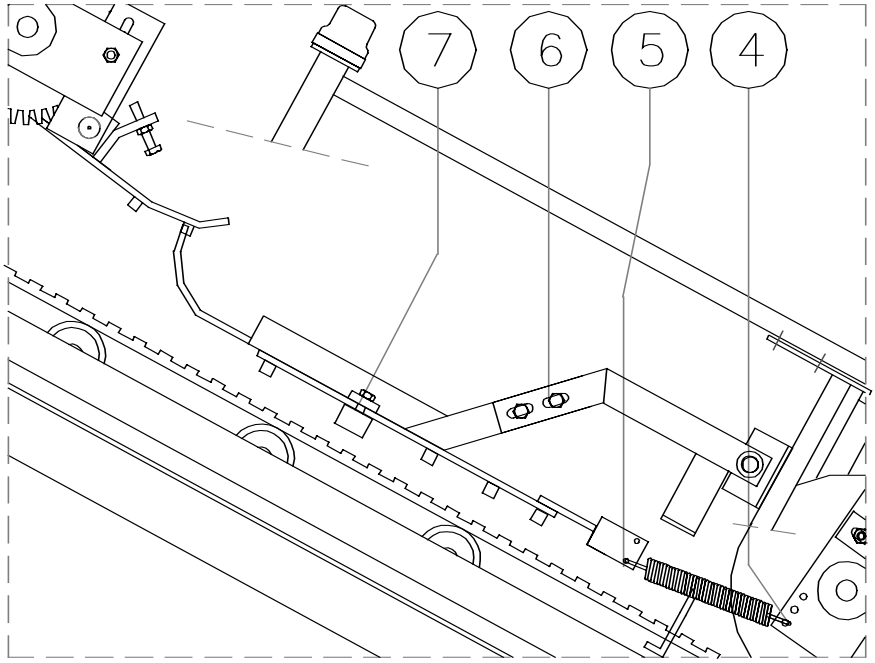
Turning fingers and folding the beginning of the sod.



Passing on folded sod to the beginning of the rolling board.

If the fingers are stabbing too deep in-between the conveyor belts, the sod will only be folded and no beginning of the roll is made.
If the fingers are stabbing not deep enough in-between the conveyor belt, the sod will not be folded, only lifted up a little bit, so there is not made a beginning of a roll. In case of very loose sods, it could be necessary that 1 of the 2 springs (parts book 101-50-30) is removed.
The right adjustment of the starting part is important and can be varied dependent on the type en thickness of the sod.

II rolling board part



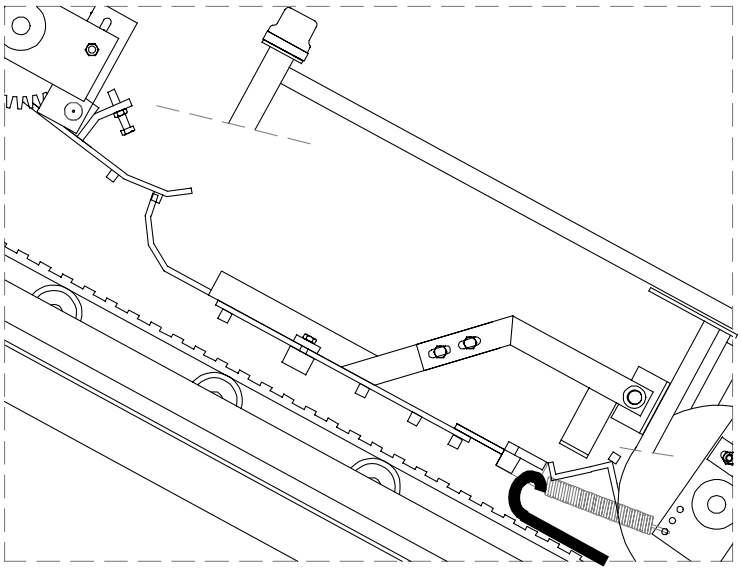
Schematically drawing rolling board part.

4	Choice of whole spring connection for height beginning rolling board.
5	Choice of whole spring connection for height beginning rolling board.
6	Adjustment height rolling board by choosing slot and hole.
7	Adjustment stop rubber height rolling board.

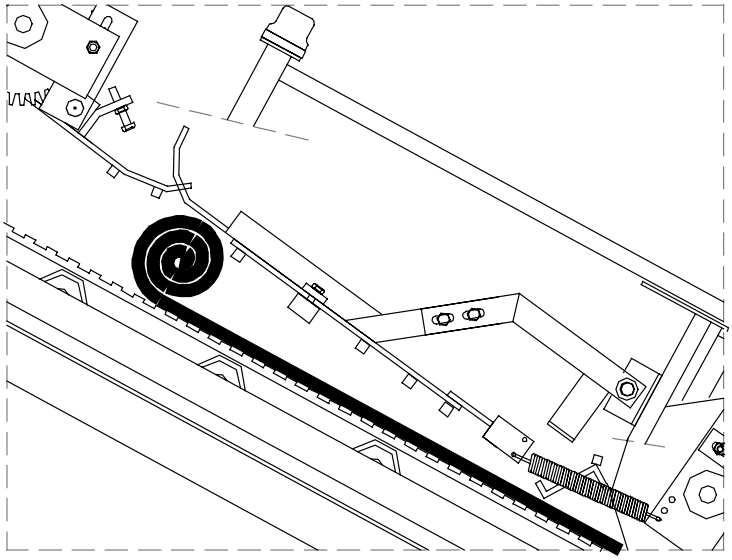
After making a beginning by folding the beginning of the sod, the rolling board is rolling a part of the sod to a roll. Important for the adjustment of the rolling board is that the beginning of the roll is passed through correctly from the starting part and that the changeover from the rolling board to the rolling wheels is correct.

The most important adjustments from the rolling board are adjustment 6 and 7. With this you can adjust the distance between the rolling board and the conveyor belt. Important is that the distance between the rolling board and the conveyor belt is bigger than the thickness of the sod. However, if the distance is getting too big, the sod can’t be rolled any more.

With adjustment 4 and 5 the position of the beginning of the rolling board can be adjusted, so that this one can take over the beginning roll from the starting part.

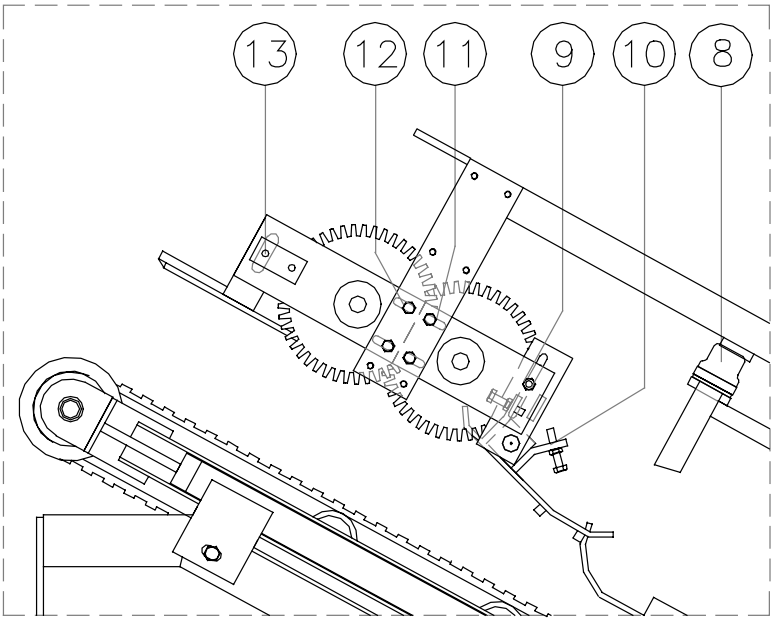


Roll at the beginning of the rolling board.



Roll at end off the rolling board.

III Rolling wheels part

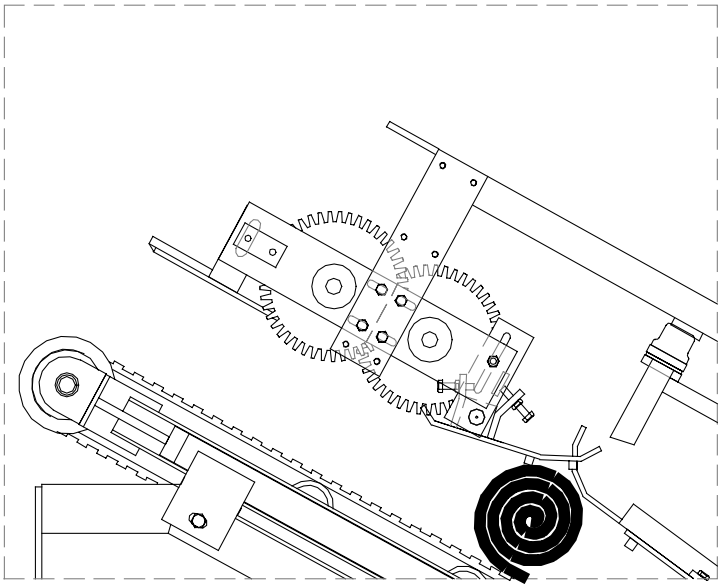


Schematically drawing rolling wheels

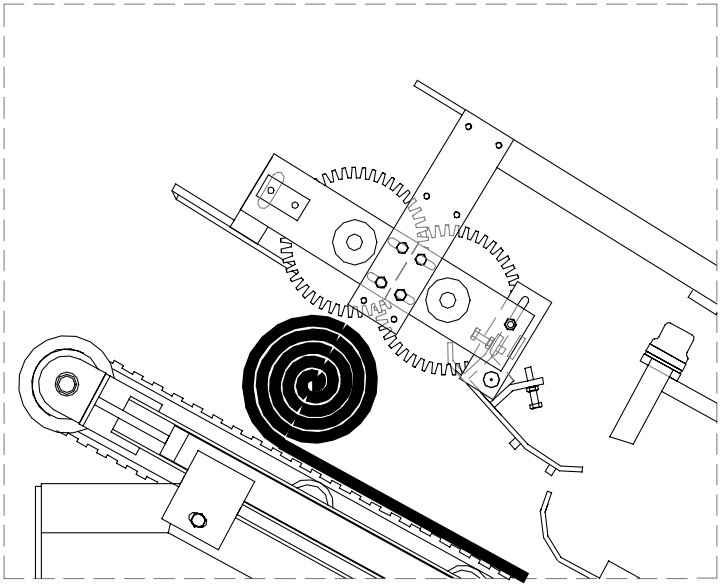
Nr.	Way of adjustment	Result
8	Moving plastic ring.	Height adjustment whole rolling wheel frame.
9	Slot hole adjustment.	Height adjustment rollup frame front.
10	Bolt + contra nut	Changing turning angle rollup frame front
11	Slot hole adjustment.	Adjustment tension chain rolling wheels
12	Slot hole adjustment.	Adjustment tension chain rolling wheels
13	Slot hole adjustment.	Height adjustment rollup frame back

Goal of the rolling wheels is to roll up the sod further and throw it out on a catching board or cross conveyor.
The whole rolling wheel part is mounted on 1 frame (parts book 101-51), which can move totally up and down, when a roll is passing under it. While going up and down the rolling wheels are still driven.
The whole rolling wheel part is supported by a pressure spring (parts book 101-51-11), to keep the pressure on the sod roll restricted.
In resting stand the rolling wheel part is resting on touch rubbers (adjustment 8). Under this touch rubber is a plastic ring mounted. This ring can be removed and added on the bottom side (under the head of the bolt for mounting). So that the same length of bolt can be used (parts book 101-50-65). The whole rolling wheel part lowering. This is wanted when you want to make smaller rolls (for instance with very thin sods).

De partly rolled sod is taken over from the rolling board part by a rollup frame front (parts book 101-51-03). This rollup frame front is the change over between the rolling board and the rolling wheels. Important for the adjustment is to make the change over between the rolling board and the rolling wheels as smooth as possible. The rolled sod needs to stay continuously in contact with the rolling parts. The height and the twisting from the rollup frame front can be adjusted with adjustment 9 and 10.

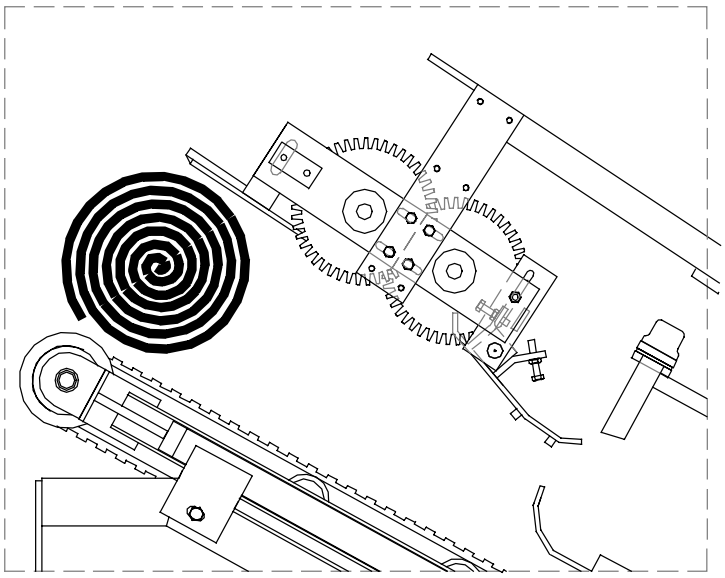


Rollup frame takes over the rolled sod from the rolling board part.



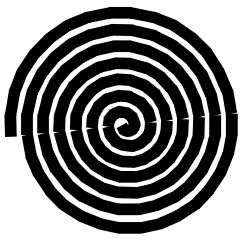
Rolled sod under the rolling wheels. Rolling wheel part is pushed up.

The plates in where the rolling wheels are turning (parts book 101-51-06 + 07) are equipped with slot holes (adjustment 11 and 12). With this the chain which is in-between the both rolling wheels can be adjusted. The backside belt roll of the conveyor belt drives the rolling wheels. The speed is a little bit lower than the speed of the conveyor belt. The relation between the speed of the conveyor belt and the rolling wheels is specified by the driving gear wheels (parts book 100-59-30 and 101-51-20). By choosing these gear wheels the relation can be changed.



Roll under backside rolling frame.

After the rolling wheels the rolled sod is transferred to the backside-rolling frame. This backside-rolling frame is adjustable in height (nr. 13). You can do this by loosening the “star button” (parts book 101-51-42), after this you can slide it up and down. By changing the height of this rolling frame, the rolled sod will be taken over a little bit earlier or later from the rolling wheels. Result is that the rolled sod is rolled a little bit more or less. A right adjustment makes sure that the end of the rolled sod is always on the top or a little bit further. The person who is stacking up the sods can handle the rolled sod easier in this case. In case that this adjustment isn’t enough (twisting is too little), you have to change the gear wheel relation between the rolling wheel and the conveyor belt.



Correctly rolled sod.

7.4.5. Trailer

The top link between the trailer and the tractor can be connected to different holes from the trailer.
The right hole is the one that:

- The pallet forks are horizontal on the ground when the trailer is lowered.

The pallet forks are a little bit tilted up when the trailer is lifted.

8. Maintenance

Proper maintenance is important for economic and profitable lifetime use of the machine and it's necessary for safe operation of the machine.
Follow the maintenance schedule as given below.
Check the machine on regular basis for play of the different components and also on loose or vibrating bolts and components.

8.1. Maintenance schedule

The maintenance schedule can be split as follows:
- Maintenance 1 x each day
- Maintenance 1 x each week
- Maintenance 1 x each month
- Maintenance 1 x yearly
- Maintenance 1 x every 2 year
- Maintenance after 20 hectares (app. 50 acres) turf are cut

A number of unmentioned points are further described below.

Maintenance 1 x each day

Nr.	Part	Parts book	Explanation
1.	Greasing grease points		See chapter survey grease points

Maintenance 1 x each week

Nr.	Part	Parts book	Explanation
2.	Check chain tension length chop off blade Oil Chain		See chapter settings and adjustments
3.	Check chain tension conveyor belt motor Oil chain drive		
4.	Check chain tension cross conveyor Oil chain drives	100-52-21	
5.	Oil chain drive rollup wheels	101-51-22	

Maintenance 1 x each month

Nr.	Part	Parts book	Explanation
6.	Check for play at eccenters for thickness adjustment		See chapter settings and adjustments
7.	Check V-belt tension cutting blade motor		See chapter settings and adjustments
8.	Check /adjust conveyor belt tension		See chapter settings and adjustments
9.	Check oil level hydro tank		See explanation further on

Maintenance yearly

Nr.	Part	Parts book	Explanation
10.	Check /replace rubber stops	100-57-40 101-50-32 101-50-33 101-52-20	
11.	Check tyre tension support wheels	100-57-03	Tyre tension 2½ bar
12.	Replace oil filter hydraulic oil	101-53-09	
13.	Check /add oil gearbox	101-53-18	See explanation further on

Maintenance 1 x each 2 year

Nr.	Part	Parts book	Explanation
14.	Replace hydraulic oil		See explanation further on
15.	Replace bearings + labyrinth lower belt roll turn around drum	100-59-16	See explanation further on

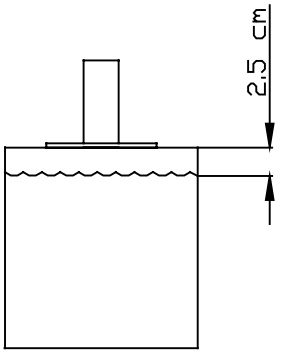
Maintenance after 20 hectare cutting

Nr.	Part	Parts book	Explanation
16.	Check scraper rollup	100-57-25	
17.	Check /setting scraper lower belt roll turnaround drum	100-59-05	See chapter settings and adjustments
18.	Check /setting scrapers upper belt roll turnaround drum	100-59-04	See chapter settings and adjustments
19.	Check guide strips conveyor belt	100-59-08 100-59-07 100-58-08	See explanation further on
20.	Check /adjust finger frame mount	101-50-04	See explanation further on
21.	Check /setting play support frame finger frame.	101-50-11 101-50-12	See explanation further on
22.	Check /setting play point of rotation rollup tray	101-50-06	See explanation further on
23.	Check /setting play finger tray	101-51-03	See explanation further on
24.	Check /setting play point of rotation upper rollup frame	101-50-01	See explanation further
25.	Replace length chop off blade	100-57-03	
26.	Check /setting play point of rotation lift arms cart frame	101-52-02 101-52-03	See explanation further on
27.	Check /setting play point of auto steer parts	101-54-10 101-54-11 101-54-12	See explanation further on

Explanation of maintenance survey

Nr. 9 + 14
Oil level hydro tank. The oil level needs to be approximately 2½ cm (1") under the topside of the tank.
Specification hydraulic oil viscosity:

Viscosity index 151 (heavy duty oil)
Viscosity at 40 degrees: **45,22 cSt (ISO46)**
Viscosity at 100 degrees: **8,03 cSt**



Oil level hydro tank

Nr.13
Oil level PTO hydro pump gearbox needs be filled in all instances up to level indicator (parts book 101-53-19)
If necessary fill with gearbox oil: **SAE 80W90**

Nr15.
Replace bearings lower belt roll turnaround drum:
1. Free conveyor belt tension (see chapter settings/adjustments conveyor belt)
2. Dismount caps (parts book 100-59-24) lower belt roll turnaround drum
3. Take roller out of its frame mount bearings
4. Place new part in
5. Mounts caps
6. Set conveyor belt tension again (see chapter settings/adjustments conveyor belt)

Nr.19.
Guides comb 100-59-08 needs to be replaced when belt openings are more than 6 mm (1/4") worn at one side.
In case or emergency, this comb can be turned and function for some extra time.

Nr 20, 21, 22, 24, 27
When mentioned rotational points have too much axial play (= in the direction of axle), this play needs be filled out with shims.

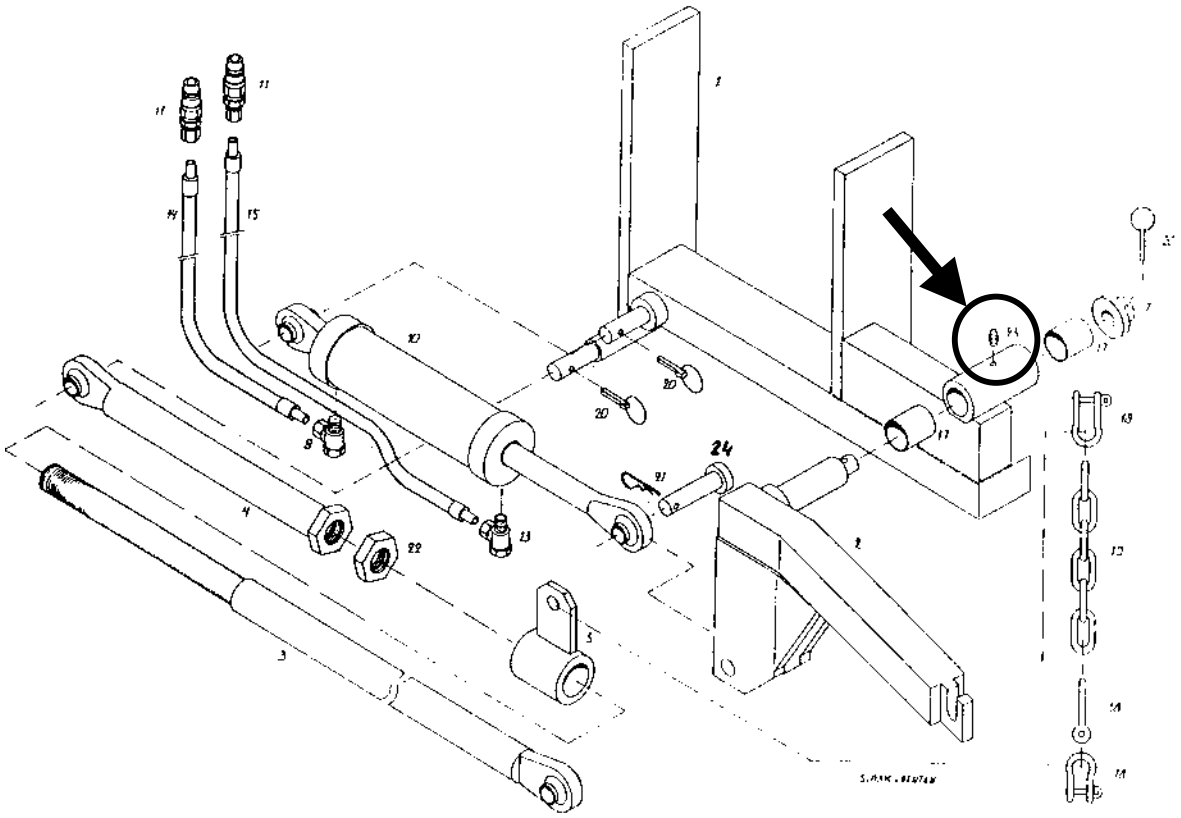
Nr. 23
The axial play (in the direction of axle) can easily be adjusted through adjustment of the 2 set bushings on the axle of the finger tray.

Nr. 26
The axial play (in the direction of the axle) can be adjusted through rotation of the nut (parts book 101-52-60) + counter nut on this axle.

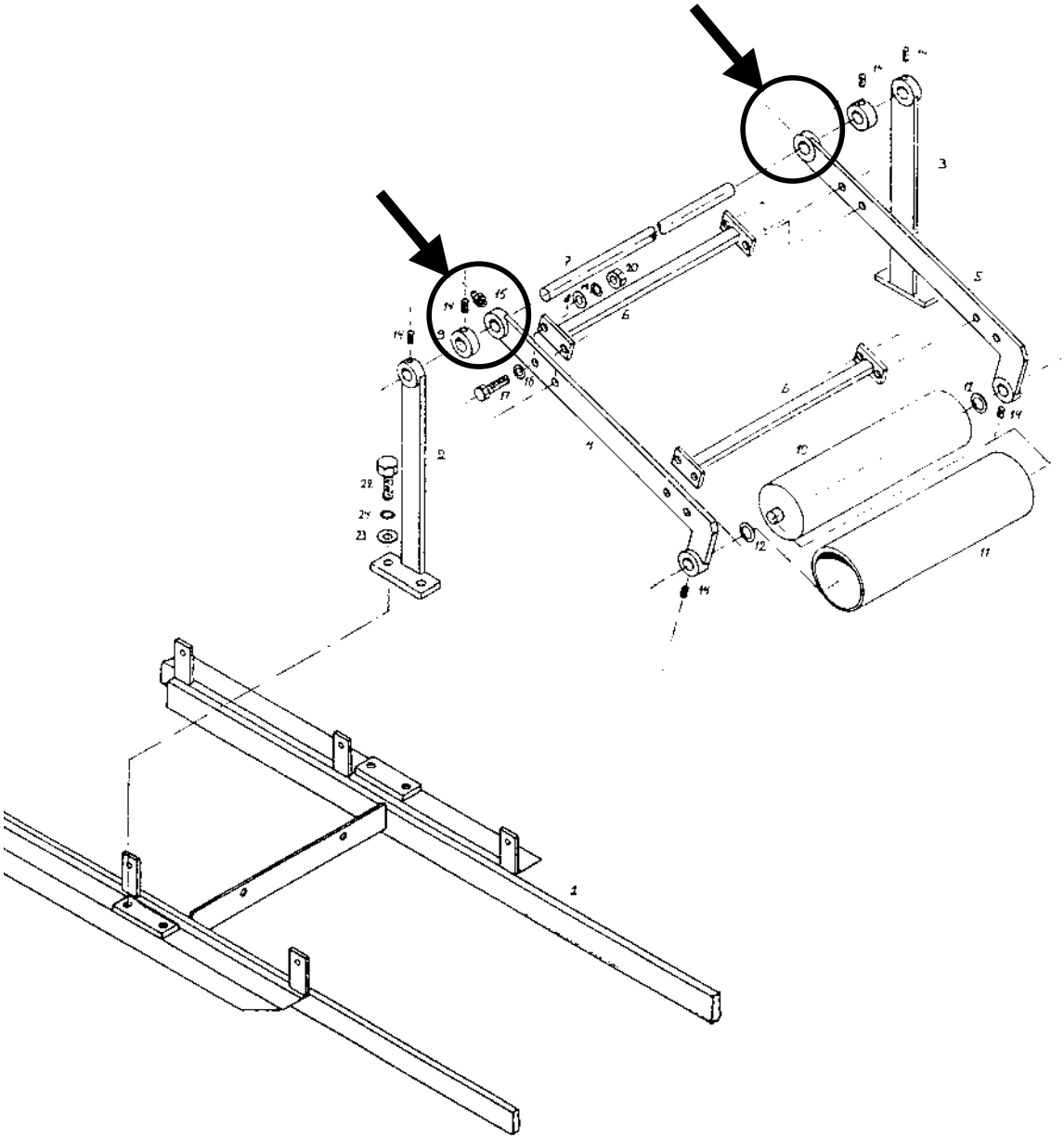
8.2. Grease points survey

In following survey is explained where the different grease nipples on the machine are located, such that at greasing they can easily be found.
Analogues to the order followed in the parts book the pages are shown.

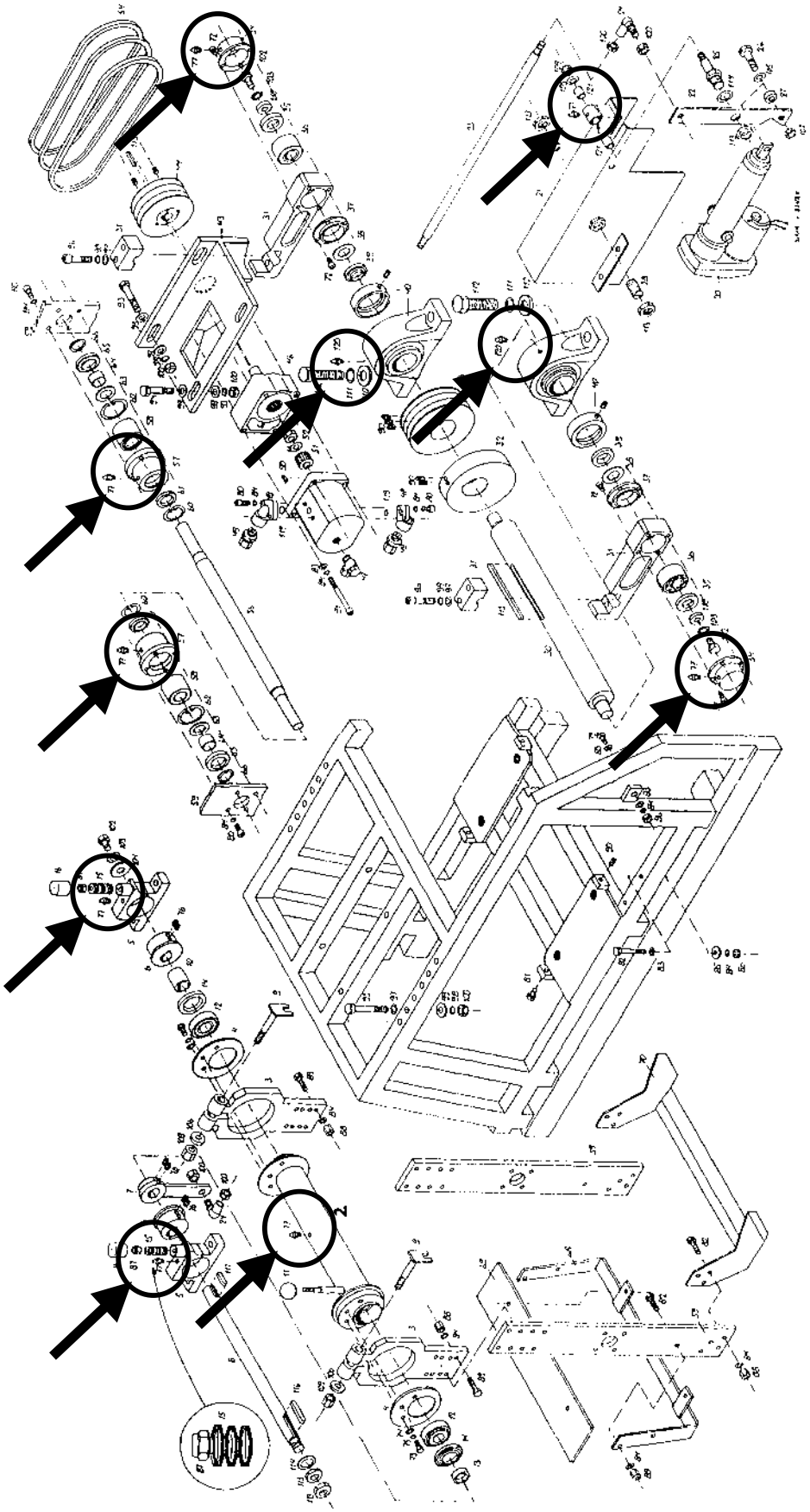
Name	**Parts book**
Connecting frame	100-50
Press roll	100-51
Cutting head area II	100-56
Cutting head area I	100-57
Main frame	100-58
Conveyor belt and frame	100-59
Rollup frame, lower area	101-50
Rollup frame, upper area	101-51
Trailer	101-52
Auto steer	101-54



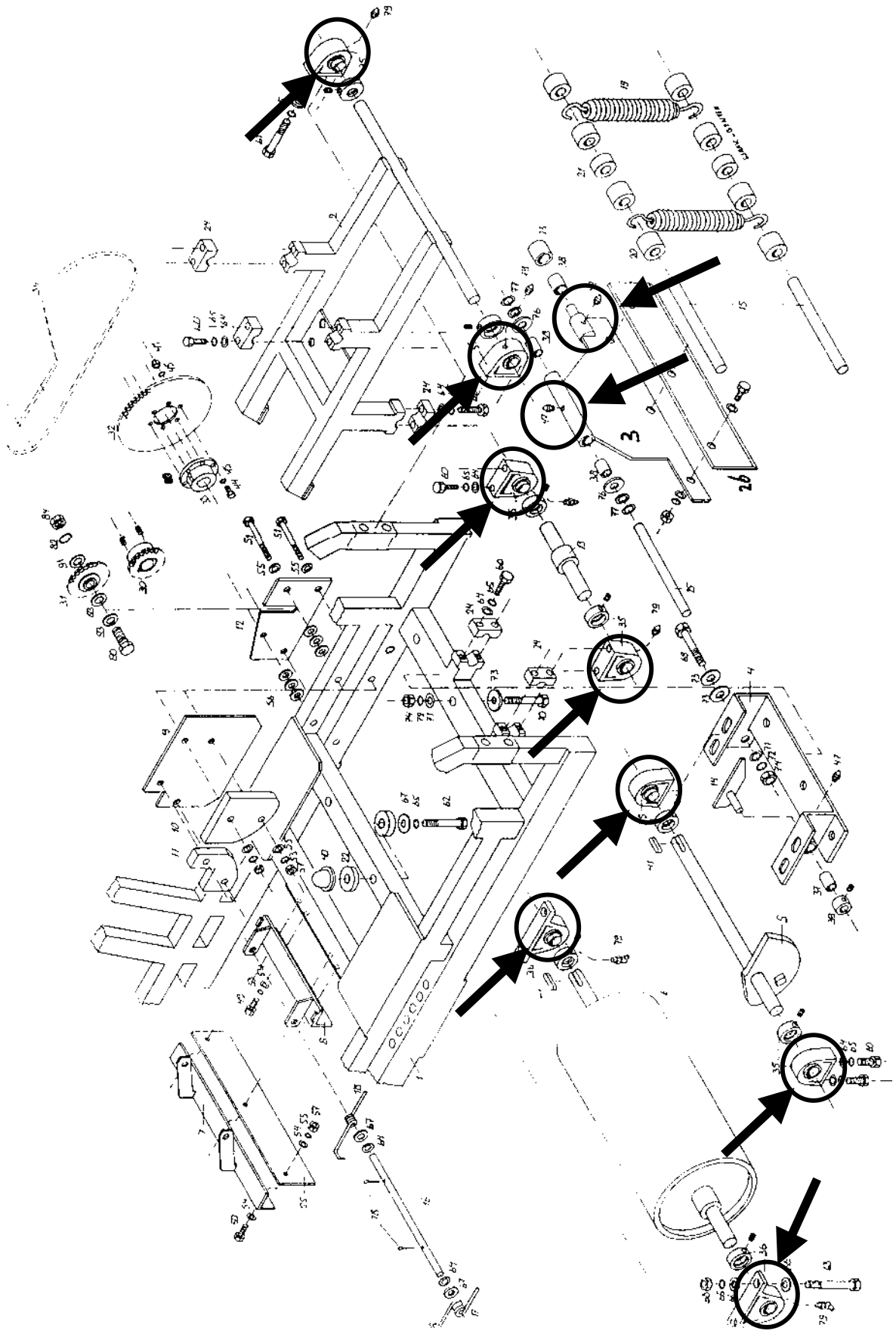
Grease points connecting frame (partsbook 100-50)



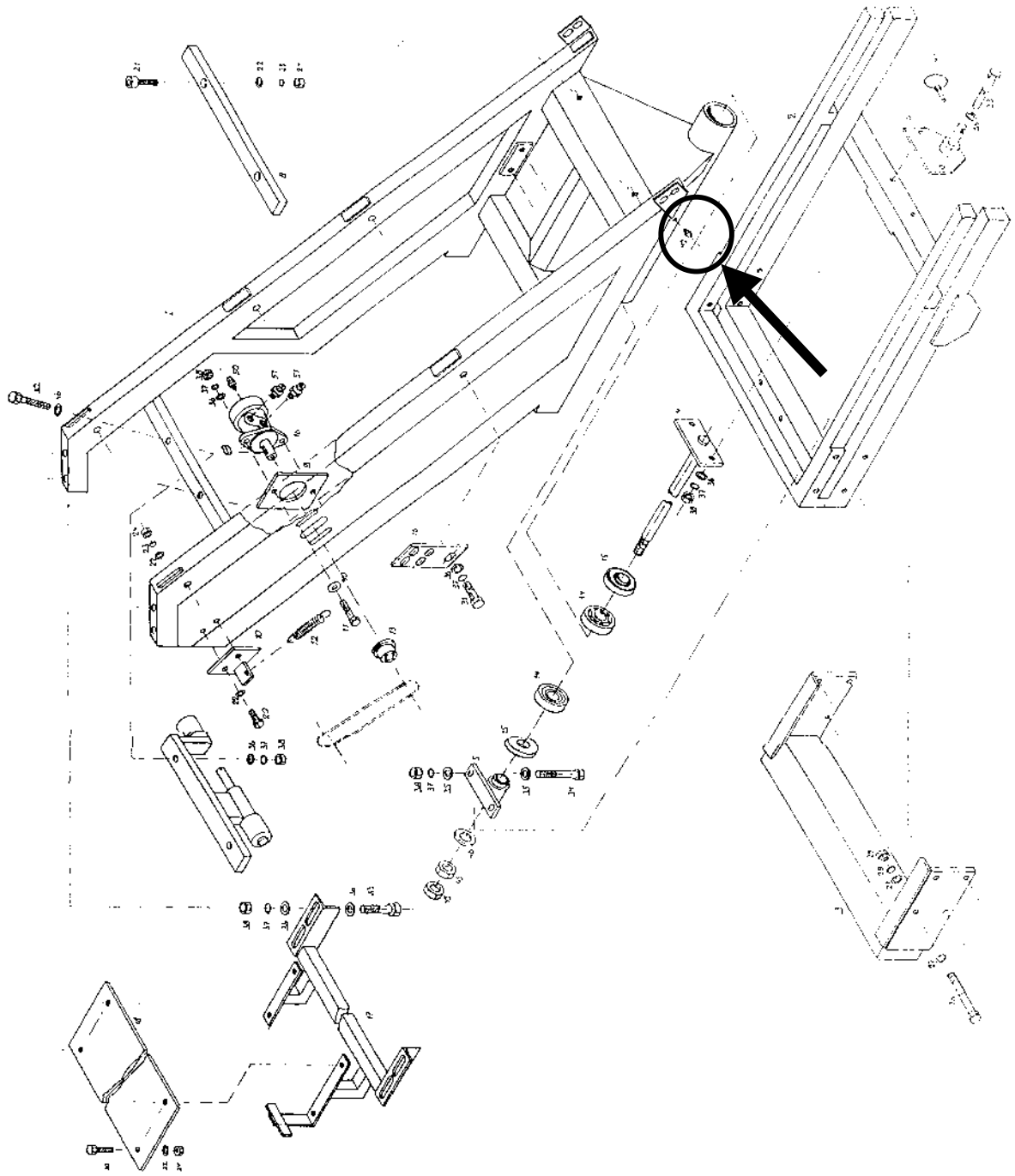
Grease points pressure roll (parts book 100-51)



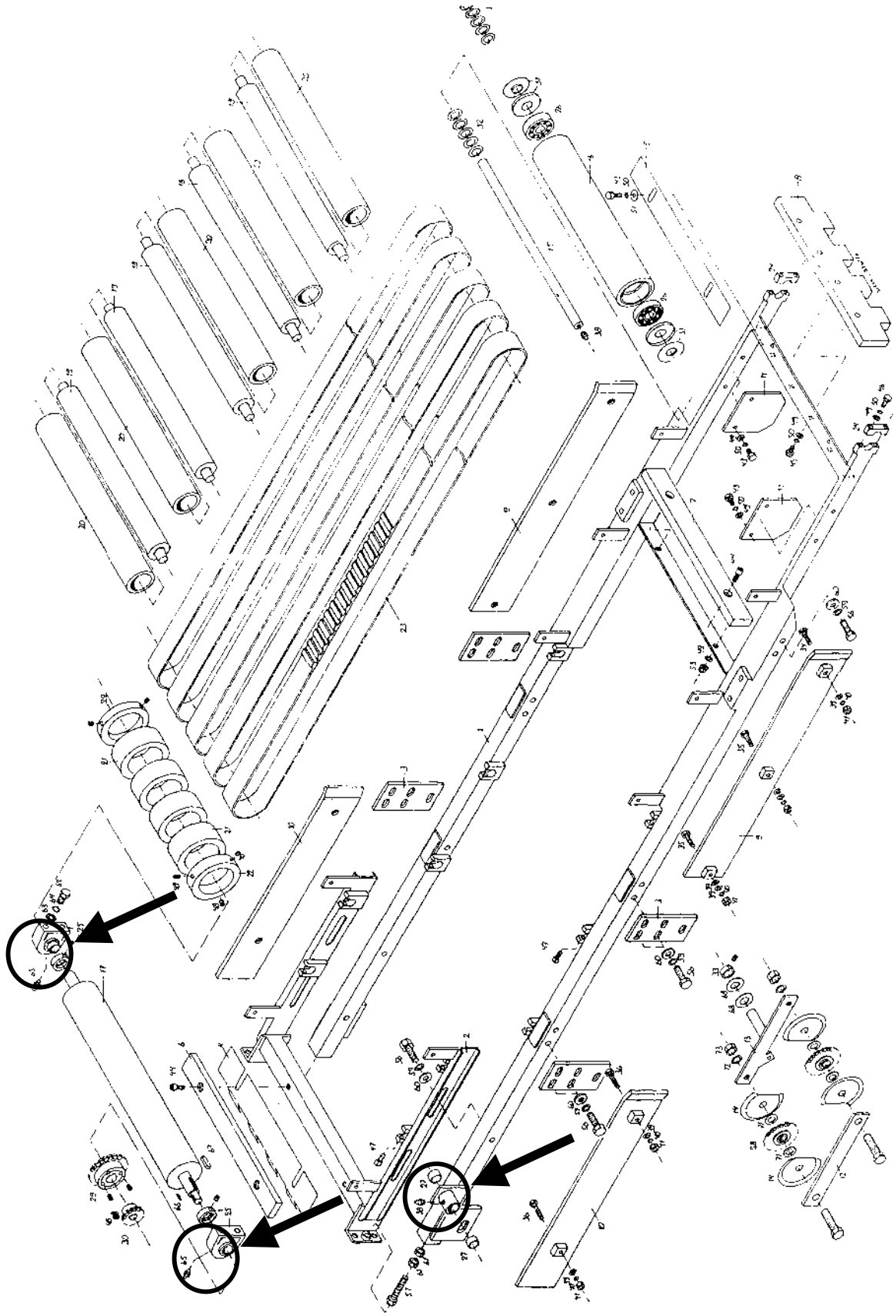
Grease points cutting head area II (partsbook 100-56)



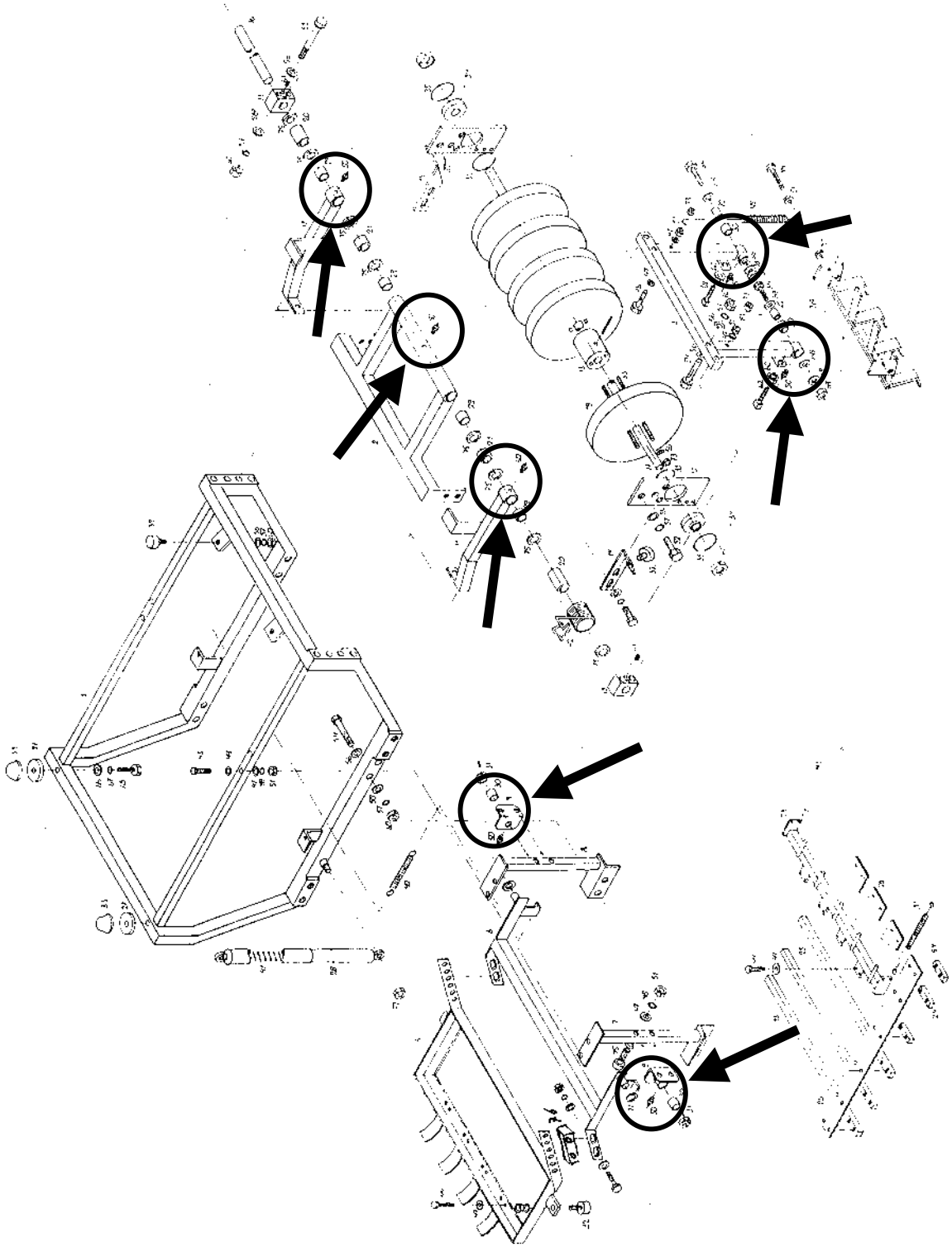
Grease points cutting head area I (partsbook 100-57)



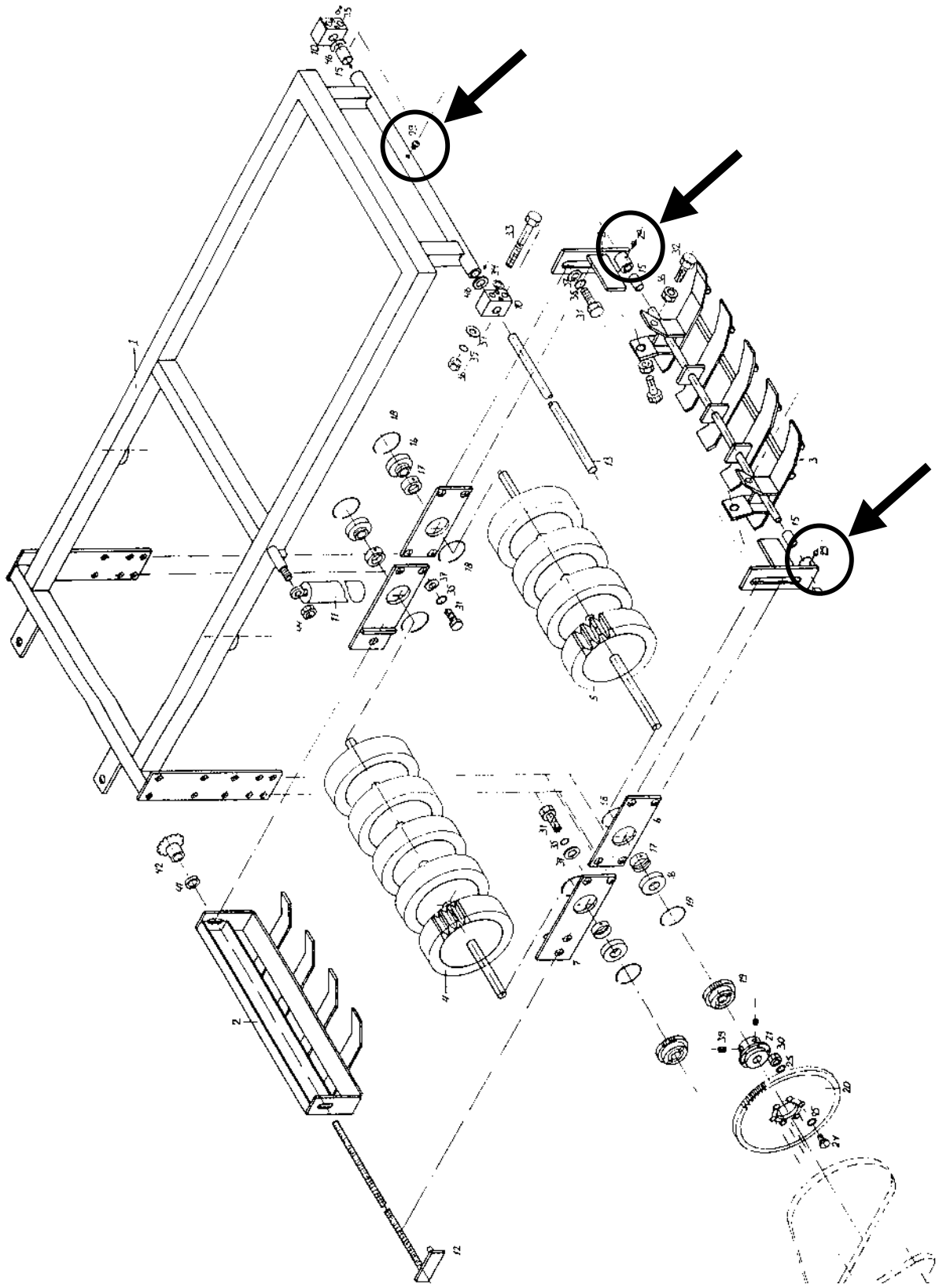
Grease points survey main frame(partsbook 100-58)



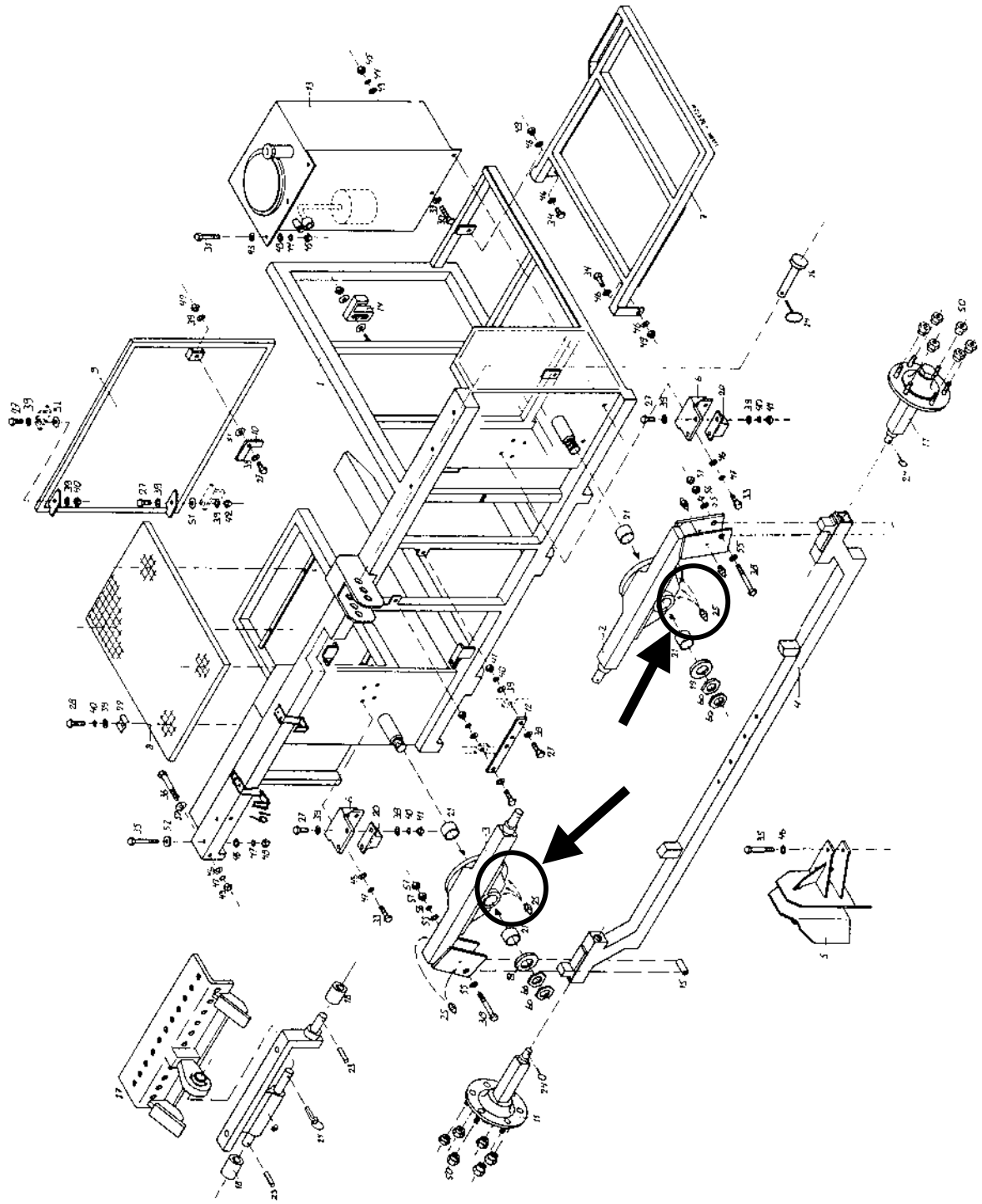
Grease points survey conveyor belt endframe (partsbook 100-59)



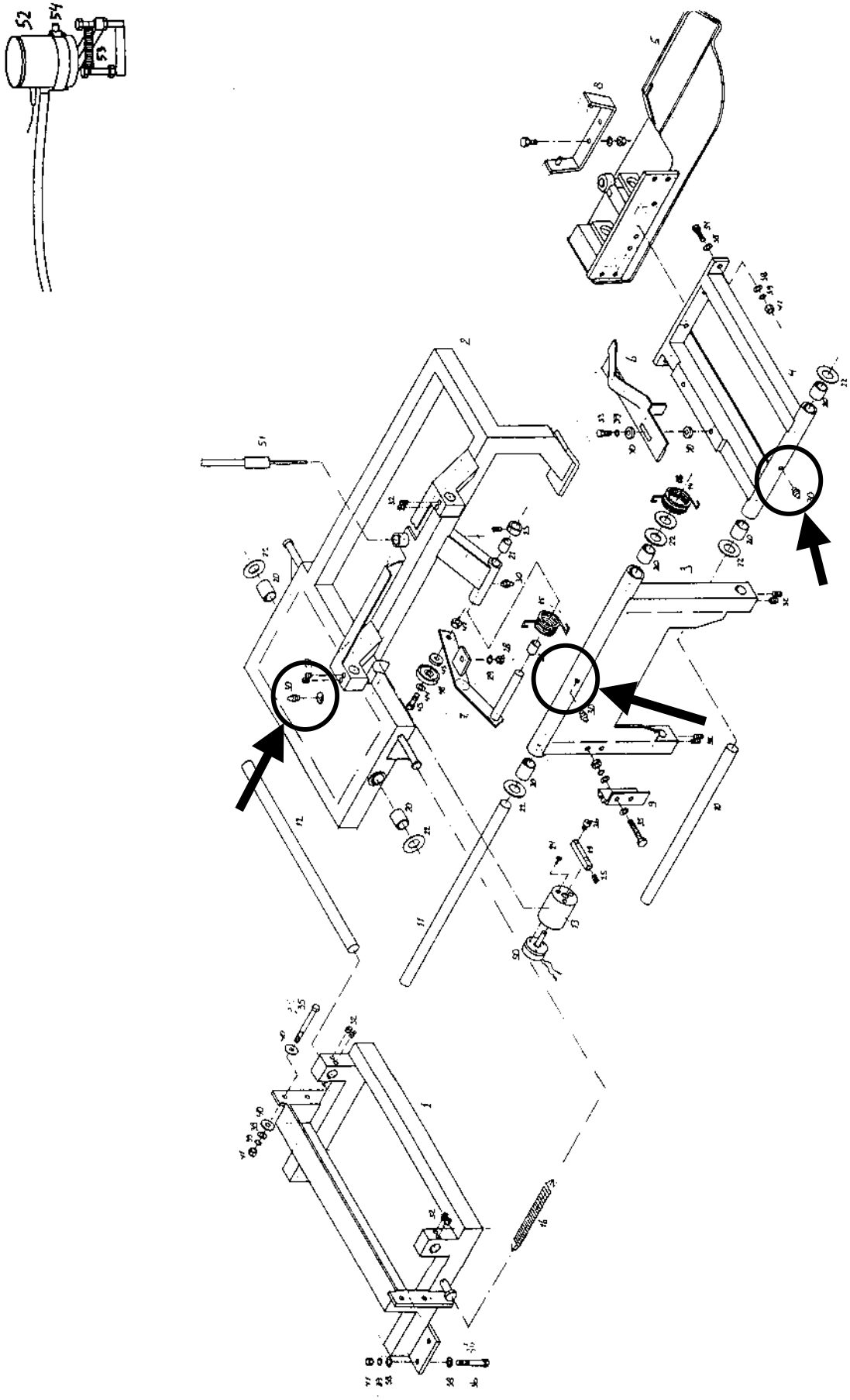
grease points survey rollup frame lower area (partsbook 101-50)



Grease points rollup frame, upper area (partsbook 101-51)



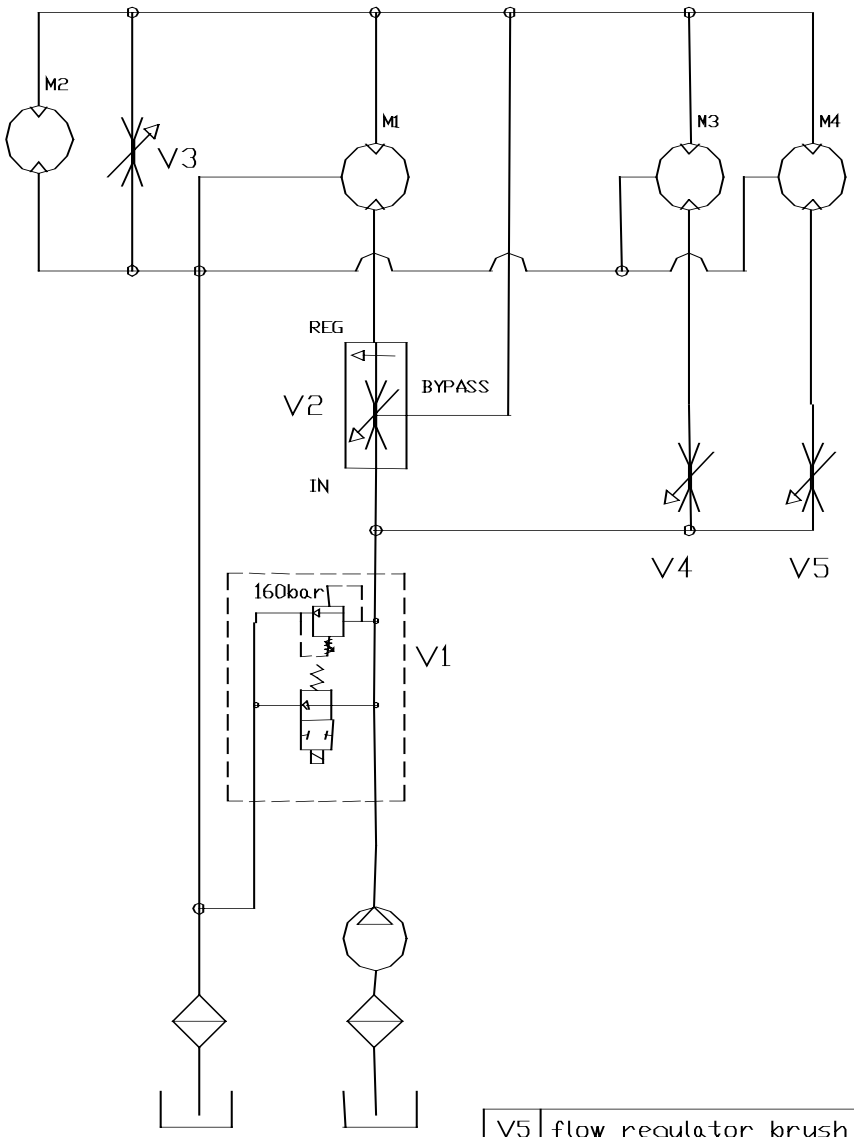
Grease points trailer (partsbook 101-52)



Grease points auto steer (partsbook 101-54)

9. Diagrammes

9.1. Hydraulic system



V5	flow regulator brush
V4	flow regulator cross conveyor
V3	flow regulator conveyor speed
V2	Priority flow regulator cutter motor
V1	Electro-hydraulic main valve
M4	brush motor
M3	Cross conveyor motor
M2	Conveyor motor
M1	Cutter motor

9.2. Electrical drawings

A description and explanation of the auto steer system can be found in the separate user manual for the auto steer system.